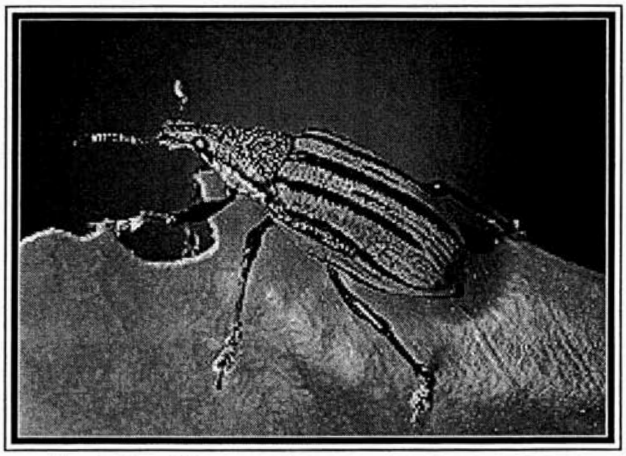
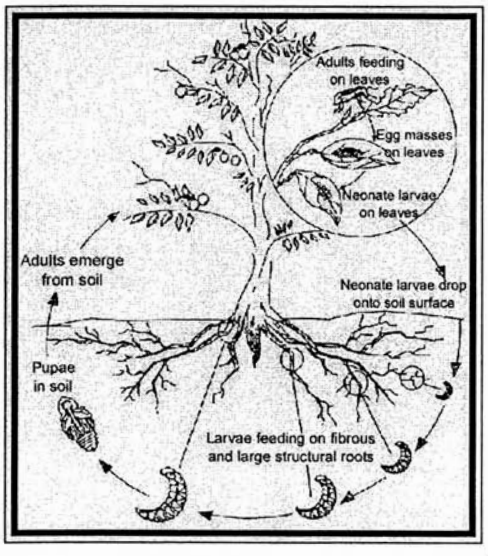
California Plant Pest & Disease Report

California Department of Food and Agriculture
Plant Pest Diagnostics Center
3294 Meadowview Road
Sacramento, CA 95832-1448

DIAPREPES ROOT WEEVIL....





known by Florida citrus growers as the

EVIL WEEVIL.

(page 45)

What's Inside:
Volume 19 Nos. 3-6,
June-December, 2000

California Plant Pest & Disease Report

Editor: Raymond J. Gill
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The California Plant Pest and Disease Report, Volume 19, Numbers 3-6, was issued and printed March, 2001.

ENTOMOLOGY HIGHLIGHTS

SIGNIFICANT FINDS

MEXICAN FRUIT FLY, *Ceratitis capitata* -(A)- Two male Mexican fruit flies were trapped in August, 2000. See the chart on page 34 for additional trap information. N(established infestations were found.

GUAVA FRUIT FLY, *Bactrocera correcta* -(A)- Eight male guava fruit flies were trapped between June and September, 2000. Please see the chart on page 34 for additional trap information. Eradication of the guava fruit fly was completed on 10/25/2000 in Los Angeles, Cerritos/LaPalma. Type of treatment was male annihilation.

ORIENTAL FRUIT FLY, *Bactrocera dorsalis* -(A)- Twenty Oriental fruit flies were trapped between June and September, 2000. Multiple flies were found in **Los Angeles** and **Orange** Counties. See the chart on page 34 for additional trap information. Eradication program of the male Oriental fruit fly in Los Angeles, Long Beach, was completed on 10/18/2000, Hacienda Heights on 10/25/2000 and Orange, Westminster on 11/02/2000. Type of treatment was male annihilation.

OLIVE FRUIT FLY, *Bactrocera oleae* -(A)- The olive fruit fly continued to be trapped throughout the state between June and September, 2000. See pages 35-39 for more trap information.

JAPANESE BEETLE, *Popillia japonica* -(A)- Nineteen Japanese beetles were collected from traps between June and September, 2000. Please see page 39 for more trap information. No established infestations were found.

GYPSY MOTH, *Lymantria dispar*, -(A)- The table on page 40 represents gypsy moth detections over the summer between June and September. Infestations have been confirmed at Novato and Fallbrook. Eradication efforts are currently underway in both locations.

VENEZUELA ORCHID MEALYBUG, *Pseudococcus neomicrocirculus* -(Q)- This mealybug was collected from a bromeliad plant by Agricultural Inspector Biologist Francisco Focha. The collection was made in **San Luis Obispo** County on January 25, 2000, but was not determined to species until August 23. The plant belonged to a hobbyist and it is not currently known if the plant had been treated. The host of the mealybug is normally orchid and known from Costa Rica, Guatemala, and Venezuela.

TWO SPOTTED LEAFHOPPER, *Sophonia rufofascia* -(Q)- This leafhopper was first found in California in 1996 by Los Angeles County Agricultural Inspector Michael Sium. Michael is credited with finding nymphs and adults in a nursery in the city of Commerce. About the same time Bernarr Kumashiro, Entomologist with the Hawaii Department of Agriculture was visiting southern California. While in San Diego County at the San Diego Zoo, Bernarr noticed suspicious nymphal cast skins and notified CDFA/PPDC that *S. rufofascia* might be established there. San Diego County Entomologist Dave Kellam was notified and he and State Nursery Services Biologist Crispin Rendon went to the zoo where they observed nymphs and

SIGNIFICANT FINDS, cont.

adults of this leafhopper on carrotwood (*Cupaniopsis anacardioides*) and on orange jessamine (*Murraya* sp.). It currently is well established in the counties of Los Angeles, San Diego, Santa Barbara, and Orange.

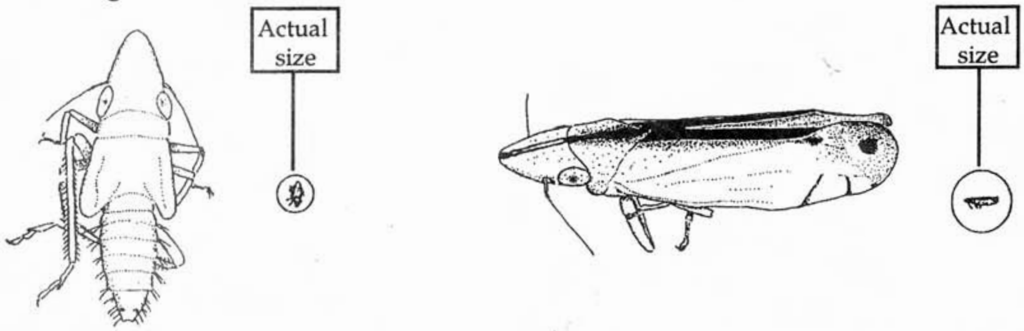


Fig. 1 *Siphonia rufofascia*. A. immature (nymph) shown with actual size. B. adult shown with actual size.

This species has been a problem in Hawaii since its introduction there about 15 years ago. It has been particularly troublesome on native ferns that are responsible for holding the soil on many of the mountainous slopes, particularly those in high rainfall areas. The ferns have been severely weakend or killed by the hoppers. Populations seem to be increasing rapidly in Southern California, and although no specific types of injury have been noted so far, such problems certainly could arise in the future. Hawaiian officials are looking into biological control, and this would be an option in California as well.

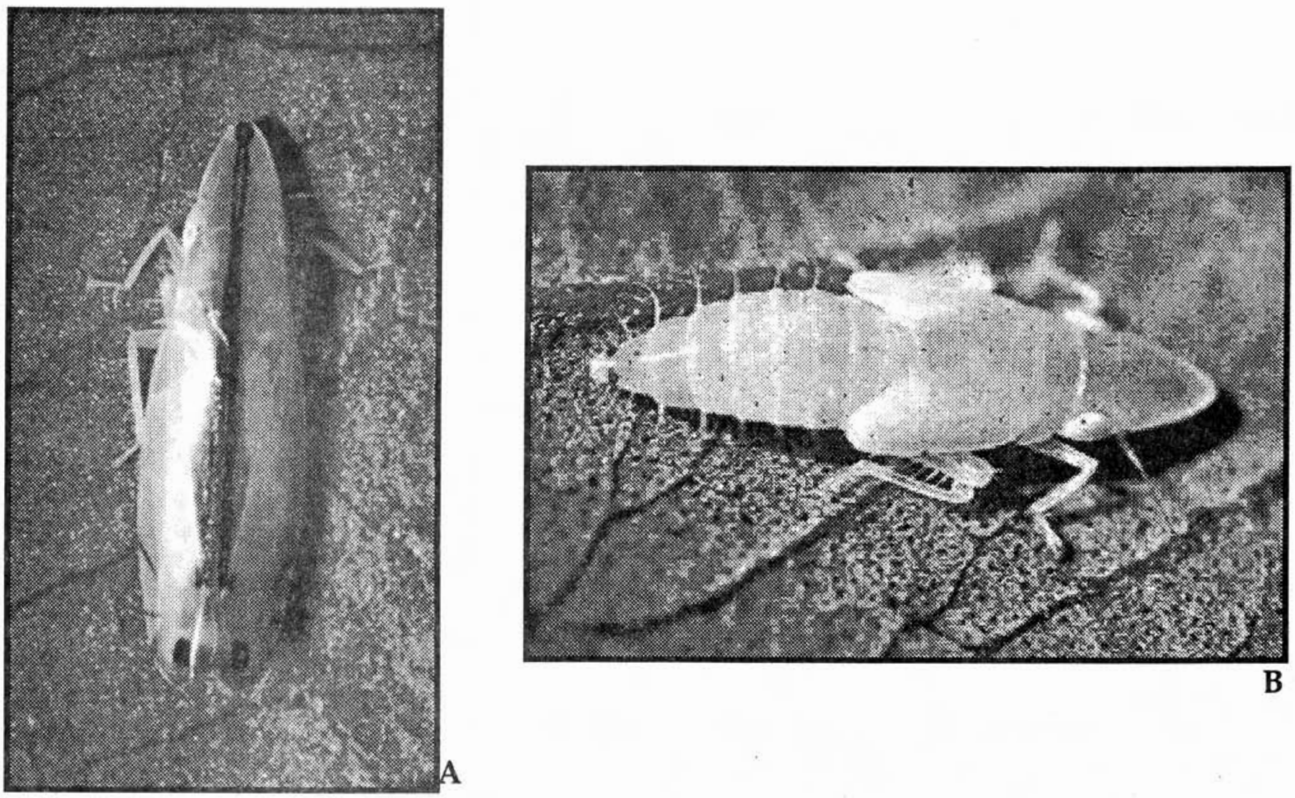


Fig. 2 *Siphonia rufofascia*. A. adult (note two black spots on wing tips). B. nymph (note two black spots on distal end of abdomen). Photos by Rosser Garrison.

PINK BOLLWORM, *Pectinophora gossypiella* -(A)- A total of 154 native (non-sterile) moths were collected during summer 2000 in the San Joaquin Valley. The total number of traps deployed during this time was 14,496. The following list indicates trap totals of native (non-sterile) moths by county:

Fresno County	Kings County	Merced County	Kern County	Tulare County	Madera County
3	18	7	89	36	1

Traps are deployed in northern California in Colusa, Glenn, Sutter, and Yolo Counties. Kern, Riverside and Imperial Counties are trapped in an effort to track movement of non-sterile moths across the desert toward the San Joaquin Valley and from Mexico.

NEW STATE RECORDS

HAIRLESS FLOWER THRIPS, *Pseudanaphothrips achaetus* -(Q)- This thrips was collected on June 22, 1999 from weeds in Bonsall, **San Diego** County, CA by Mike Hoddle, Department of Entomology, University of California, Riverside. The following report has been submitted by Steve Nakahara, Collaborator, USDA Systematic Entomology Laboratory, Beltsville, MD.

Synonyms: *Pseudanaphothrips achaetus* Bagnall 1916.

Distribution: Described from Australia in 1916 and subsequently found in New Zealand in 1941.

Recorded Hosts: *Acacia myrtifolia, Backhausia citridora, Boronia, Cyathodes* foliage, *Dactylis glomerata, Echium, Epachris impressa, Hebe odora, Helichrysum, Gentiana corymbifera,* grasses, *Medicago sativa,* moss, *Notothlaspi rosulatum, Oxylobium capitatum,* passion fruit, strawberry, *Trifolium repens,* and white clover. Intercepted at Honolulu, San Pedro, and San Francisco from Australia and New Zealand on *Chamaelacium unicinatum, Dianthus, Erica, Gladiolus, Leontopodium faurei,* and *Rosa.* Lives in flowers

Economic Importance: Not reported as a pest.

Description:

Colour: Pale brown. Antennal segment III yellowish. Tarsi and apices of tibiae yellow. Forewings shaded. Major setae dark.
Structure: Head (fig. 3A) wider than long. Antennae 8-segmented; Segments III and IV each with a forked sense cone. Pronotum (fig. 3B) transverse, with no long setae. Metanotum, fig. 3C. Forewing 1st and 2nd veins each with a complete row of setae. Tergites VI-VIII with 2 or more rows of irregular microtrichia laterally on oblique lines of sculpturing (fig. 3E); tergite VIII (fig. 3F) with postmarginal comb usually represented by few broadly triangular teeth laterally and a smallgroup of long, fine teeth medially. Male similar to female, but smaller. Sternites III-VII each with a slender, transverse glandular area (fig. 3D).

NEW STATE RECORDS, continued

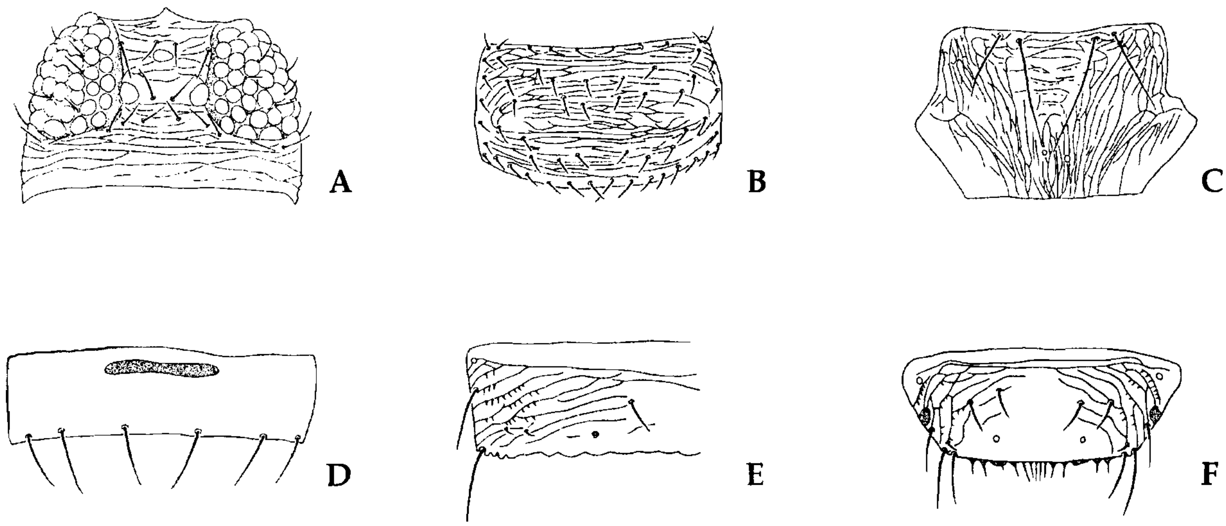


Fig. 3 *Pseudanaphothrips achaetus*, A. head. B. pronotum. C. Metanotum. D. transverse glandular area (sternites III-VII). E. irregular microtrachia on tergites VI-VII. F. tergite VIII with postmarginal comb.

Since there are no published reports of injury in Australia or New Zealand, it is impossible at this time to predict whether this species will become a problem here in California. Since Bonsall is a semi-rural locality with mixed agriculture, chaparral covered hillsides and the beginnings of urbanization, it will probably not have any problems finding adequate feeding hosts. The semi-isolated locality suggests that it may be widespread in the general area of northern San Diego County.

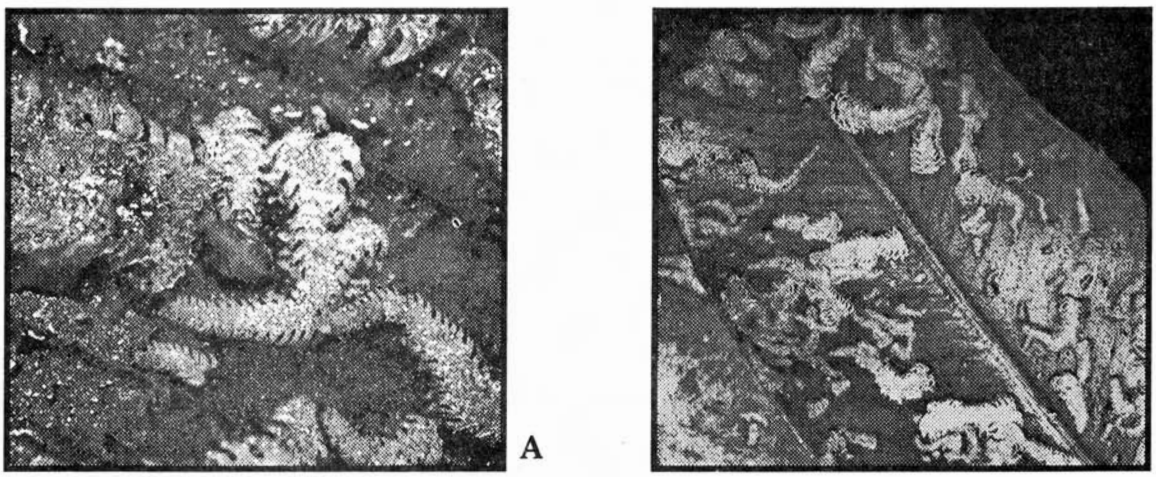
SPOTTED GUM LERP PSYLLID, *Eucalyptolyma maideni* -(Q)- This lerp psyllid represents a new state and North American record found for the first time at Westchester, **Los Angeles** County on August 16, 2000. The collection was made by a pest control advisor and was submitted for identification by Los Angeles County Entomologist Rosser Garrison. The common name is taken from the Australians, who named it due to its feeding on the spotted gum, *Eucalyptus maculata*.

The identification was confirmed by psyllid specialist Dr. Daniel Burckhardt from Geneva, Switzerland, while he was visiting the USDA Systematic Entomology Laboratory at Beltsville, MD. This is the second Australian lerp psyllid to arrive in California, and it adds another name to a long list of Australian eucalyptus feeders that have become established here (see CPPDR 14(3-4):31, 17(1-3):24, in the last 15 to 20 years. This psyllid prefers the complex of *Eucalyptus* species including *E. maculata* and *E. citriodora*, the so-called spotted or lemon gums. In Australia it occurs primarily in Queensland and Tasmania, but has been introduced with its hosts to South Australia also. It has three yearly generations in Australia, and prefers fully mature leaves upon which to feed and develop. It produces copius amounts of honeydew which attracts ants, such as the Argentine ant, that often protect the nymphs.

NEW STATE RECORDS, continued

In Australia, the species is a problem primarily on monocultures of the preferred hosts planted along city streets and in gardens. No apparent damage to the host has been recorded but the honeydew and associated sooty molds are a nuisance. Southern California infestations are no exception in this regard. The lerps are of unique form, cone shaped with projecting lateral ribs (fig. 4). The following information on biology is adopted from Martin (1984) "Psylloidea of South Australia":

> The eggs are yellow when first laid but darken to a slate grey. They resemble those of the greenhouse whitefly in that they remain erect, are elongate oval and almost parallel sided. Usually deposited in the lower or basal half of leaves, they hatch in 10-20 days in spring and summer but may incubate for months in winter. Nymphs of this species are quite mobile and move about much more than those of lerp forming *Glycaspis*. All stages can occupy existing lerps and it is not uncommon to find several instars in a mature lerp left from the previous generation, which they add to in various ways. These are usually detectable through the white dry surface of the old lerp and the glabrous appearance of the newly produced sections. When occupying an existing lerp, the nymphs will turn and back into the opening. While feeding, both nymphs and adults 'nervously' tap their front tarsi and may move the body around the feeding site in an arc without withdrawing the stylets. This is probably associated with changing the direction of probing within the leaf in selecting the specific cells in which to feed. Adult feeding apparently stimulates other adults and nymphs to feed nearby on the same leaves.



A B

Fig.4 *Eucalyptus maideni.* A. immature spottedgum lerp psyllid; B. spottedgum lerps

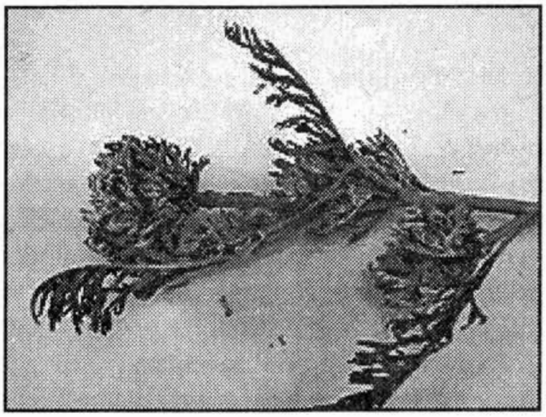
A PSYLLID, *Acizzia* sp. -(Q)- An undescribed psyllid, probably native to Australia, represents a new state and North American record found for the first time in Santa Barbara, **Santa Barbara** County on May 8, 2000.

The psyllid was collected by Santa Barbara County Entomologist Jerry Davidson at a local nursery from she-oak, *Grevillea banksi.* The discovery was in response to a request from the nursery to evaluate some abnormal growth on some of the *Grevillea* nursery stock (fig. 5).

Jerry found all stages of the psyllid among the leaflets of the abnormal growths. It is not known at this time if the psyllids caused the galls but that possibility is unlikely. More probable is

NEW STATE RECORDS, continued

that the abnormal growth either provides better shelter, better nutrition, or both. The growth may be caused by physiological incompatabilities due to grafting of different varieties.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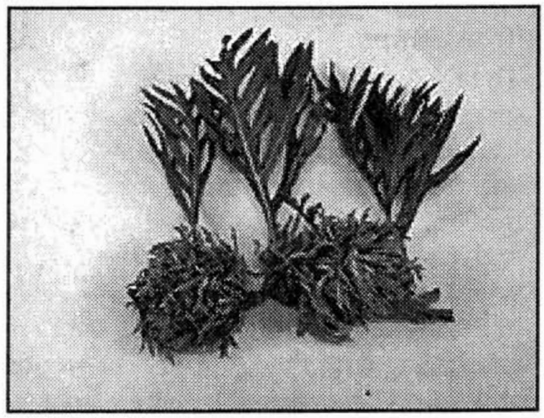
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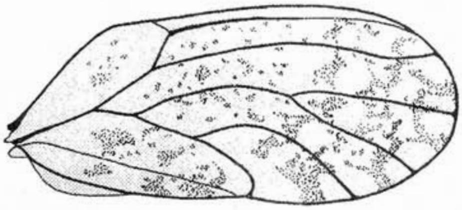
Fig.5 A & B. *Grevillea* sp. showing abnormal growth structures housing the new *Acizzia* psyllid.

The species seems very close morphologically to *Acizzia hakeae*, another Australian species recorded from *Hakea*, an Australian plant genus in the same family, Proteaceae, as *Grevillea*. The plant family also includes *Macadamia* and *Leucadendron*. Whether this psyllid species will cross over from *Grevillea* to other genera is unknown.

The species is most likely undescribed. The identification has been confirmed by Dr. Daniel Burckhardt, psyllid specialist from Geneva, Switzerland. Dr. Burckhardt is planning a trip in the near future to Australia to study similar species and complexes of other species. Figure 6, taken from Tuthill, "On the Psyllidae of New Zealand (Homoptera)", in Pacific Science VI (2):91-92, 1952, shows the morphology of the very similar *Acizzia hakeae*. This new psyllid has been re-collected recently from the same location but so far it has not been found anywhere else. It is likely that the new psyllid has established itself in California, since this nursery has not received grevillea plants from outside the state.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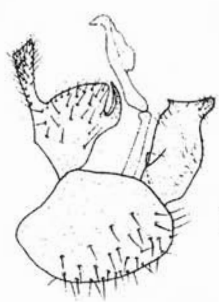
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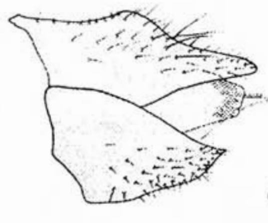

C

Fig.6 *Acizzia hakeae*. A. forewing; B. lateral aspect of male cauda; C. lateral aspect of female cauda

NEW STATE RECORDS, continued

PLASTER BAGWORM, *Phereoeca praecox* -(C)- This new moth species was first collected in California on January 28, 1986. A very comprehensive article on this find, along with other records, biology and economic importance was eventually published by Hanif Gulmahamad in a paper entitled, "Establishment of an exotic plaster bagworm in California (Lepidoptera:Tineidae)" in Pan-Pacific Entomologist 75(3):165-169, 1999.

This genus of small moths is similar to the well known and common case-making clothes moths of the genus *Tineola*, also in the family Tineidae. The pupal cases of the two are different, those of *Phereoeca* are spindle-shaped but flattened. Those of *Tineola* are more linear and cylindrical. The *Phereoeca* genus of moths is known by several common names such as wall bagworm or plaster bagworm, based on pupation sites or of sand, brick, and plaster particles and other available debris near the pupation sites, that is often incorporated into the pupal case.

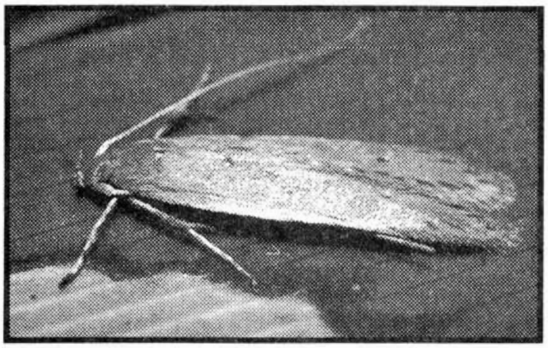
The original collection of these bagworms was made by a pest control operator, who submitted them to **Orange** County Entomologist Nick Nisson. That first collection was inadequate for a positive identification, which would not be made until much later when the species again showed up in 1997. Identification was finally made at the British Museum of Natural History via the Smithsonian Institute.

The genus *Phereoeca* contains six species, known from the Old and New World tropics. The new California species was described from the Ethiopian region in 1973 by Gozmani and Vari. Larvae of the genus are believed to feed on insect parts, flannel, wool, other fabrics, spider webs, fur or other animal hair and feathers. Gulmahamad reports this species destroyed a natural zebra skin rug at one collection site in Orange County. For further collection data see the same topic under New County Records on page 33.

PALM LEAF SKELETONIZER, *Homaledra sabalella* -(Q)- This species of moth has become established for the first time in California. The collection was made in Rancho Santa Fe in **San Diego** County on Canary Island palms by David Kellum. This new state record is currently being evaluated. It is suspected that the infestation has been there for several years and may be due to some new housing developments there. So far, about 2 acres and 40 trees are infested. Senegal palms, California fan palms, and Canary Island palms are the only palms affected at this time. King and Queen palms on the property are not infested so far. A survey is being conducted to determine if there are any satellite infestations, eradication may be considered if there are none detected.

Palm leaf skeletonizer (fig. 7A) is a pest of ornamental palms and palmettos. It attacks many varieties of palms within the family Palmaceae and decreases their value for decorative purposes. The larvae are the only destructive stage of this species and live in colonies of 35-100. When the larvae hatch they begin at the point of contact between the egg and the leaf surface. They then spin a protective web of silk, under which the colony feeds. The upper surface of the web is covered by fecal matter from the larvae. The web is extended as the larvae feed and move up the leaf, mostly to afford protection during feeding. Both the upper and lower surfaces of the leaves are subject to attack. Infested palms are seldom killed. However,

NEW STATE RECORDS, continued


A


B

Fig. 7 A. Palm leaf skeletonizer, *Homaledra sabalella,* adult. B. Larval damage to palm leaf.

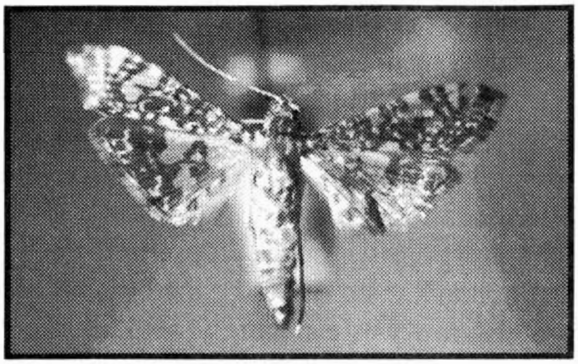
the dead leaf areas and silk webbing incorporated with frass make the palms very undesirable as ornamentals and decor (fig. 7B). There is a strong possibility that this moth will be a problem in the commercial date orchards in the Coachella Valley.

AN OLEANDER MOTH, *Glyphodes* sp. -(Q)- In August 2000, pyralid (Pyralidae) moths (fig. 8) were reared from oleander (*Nerium oleander*). The larvae were taken at a residence in Newport Beach, **Orange** County, California. In September 2000, one additional adult specimen was forwarded to the PPD Center, which had been captured in an avocado tree at a residence in Coronado, **San Diego** County. In the absence of feeding evidence or larvae, we do not consider avocado to be a host for this pyralid moth.

Although the moth is quite striking in appearance, it could not be immediately identified. Mr. Michael Shaffer, British Museum of Natural History, London, responded to queries regarding the moth stating, "It belongs to a species-complex under the name *Glyphodes onychinalis* (Guenee, 1854), subfamily Spilomelinae (Crambidae)." This onychinalis-complex consists of several species (some undescribed) covering the Afro-Asian area, extending through Indonesia, Australia and New Zealand. Mr. Shaffer states that, based on the heavy markings, the California specimens most closely resemble material from New Zealand and almost certainly consists of an undescribed form from this species-complex. He further states that we were correct in assuming this species has been introduced into California, and as far as he is aware is the first American record.

Dr. M. Alma Solis, Systematic Entomology Lab., USDA, National Museum of Natural History, Washington, D.C., concurred with Mr. Shaffer on the identity of the moth. She could find no specimens of this moth in the National Museum collection but saw a large series of species in the "complex" from the Philippines and others from Africa, including South Africa. Dr. Solis agreed with Shaffer saying, "Michael is also correct that it is probably the first record for the U.S." She could find no references to any of these species being reared from oleander or any citations regarding their biology.

NEW STATE RECORDS, continued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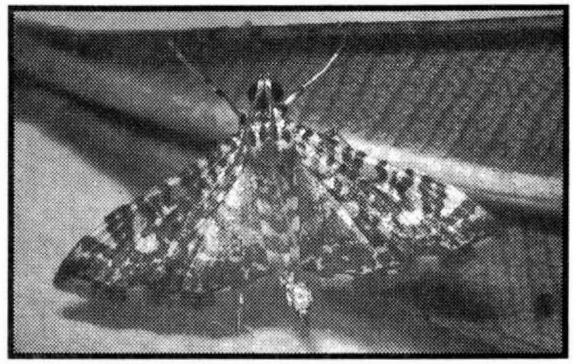
B

Fig. 8 A&B *Glyphodes* sp.

ASH MOTH, *Zelleria* sp. -(Q)- Recently, September 2000, samples of a small moth were sent to the PPD Center, reportedly defoliating ash trees in **Del Norte** County. Moths were sent from a golf course in Crescent City and from Oregon ash trees in the Jedediah Smith Redwoods State Park near Hiouchi. These were identified as *Zelleria* sp. (Yponomeutidae), and based on wing venation, structures of the genitalia and specifics of their behavior, it was determined that it is near a foreign species, *hepariella* Stainton and not previously recorded from California. It could not be determined at this time if the species was ever introduced into North America. *Z. hepariella* occurs in Great Britain, through Europe (expanding) and Japan. Like the introduced moth, this species is known to feed on ash, producing similar webbing on the leaves containing many cocoons. They live in a thick silken web spun among the leaves, often including several larvae. Pupation occurs in a dense white cocoon on the leaf, often several cocoons formed in the "communal" web (fig. 9).

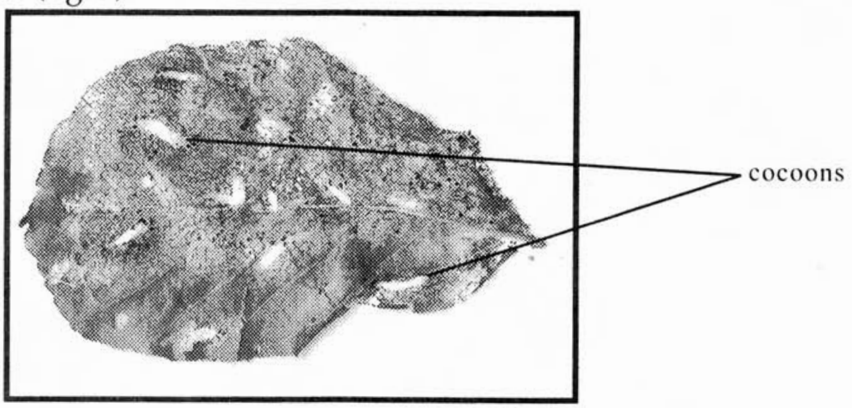

Fig.9 Oregon ash leaf showing cocoons of *Zelleria* sp.

NEW COUNTY RECORDS

SPOTTED GUM LERP PSYLLID, *Eucalyptolyma maideni* -(Q)- This lerp psyllid represents a new county record found for the first time at Anaheim, **Orange** County on August 21, 2000. The collection was made by a pest control advisor from *Eucalyptus citriodora* and was submitted to the Agricultural Commissioner for identification. Subsequent surveys found other locations,

NEW COUNTY RECORDS, continued

with heavy infestations in and around Disneyland. This is the second county record, the first being Los Angeles County (see New State Records, pg. 27). In Los Angeles County, the psyllid is known from Westchester and Santa Monica.

VINE MEALYBUG, *Planococcus ficus* -(B)- This mealybug was found for the first time in **Santa Barbara** County at Santa Maria on July 5, 2000. The specimens were submitted through the San Luis Obispo Commissioner's office by U.C. Extension specialist Mary Bianchi. The site was a small 2 year old planting that had origins from what has turned out to be infested areas in the southern San Joaquin Valley. When the seriousness of this mealybug was considered, the grower felt that it was prudent to just tear out the vineyard, rather than face pest control costs and yield losses in the future.

MISCANTHUS MEALYBUG, *Miscanthicoccus miscanthi* -(Q)-This grass infesting mealybug was found for the first time at Ukiah, **Mendocino** County on December14,1999. The collection was made from ornamental miscanthus grass growing on the Mendocino College campus. The collection was made by college staff member Jim Xerogeanes. The mealybug is apparently restricted to grasses in the genus *Miscanthus*. It currently is known from Los Angeles, San Diego, Santa Barbara, Tulare, and Orange Counties.

ASCLEPIAS MEALYBUG, *Vryburgia trionymoides* -(Q)- Asclepias mealybug was found for the first time in two new counties. On January 19, 2000, it was found in Carpinteria, **Santa Barbara** County on succulents (Crassulaceae) by county biologist Phil Bopise, while inspecting nursery stock. Another infestation was found at El Dorado Hills, **El Dorado** County, on February 22, 2000 by CDFA Plant Pathologist Tim Tidwell, also on succulents. This mealybug is also known from Orange and Yolo counties, usually on plants in the family Crassulaceae. The mealybug usually kills the infested plants. More information is available in CPPDR 13(5-6):84-85.

KUNO SCALE, *Eulecanium kunoense* -(B)- A heavy infestation of the Kuno scale was found on the Sonoma State University campus, Rohnert Park, **Sonoma** County. This find represents a new county record found on February 5, 2000 on crabapple by Jim Xerogeanes. A new record for **Marin** County was also found by Jim Xerogeanes, on Cal Trans property at Novato from *Malus* species on July 10. A third new record is from Richfield, **Tehama** County, collected by a grower representative. The collection was made from a commercial prune orchard on May 15 and was submitted to CDFA for identification. This scale can be a serious pest, and it is known to kill host trees if not controlled. It currently occurs in Alameda, Butte, Contra Costa, Lake, Marin, Napa, Sacramento, Santa Clara, Solano, Sonoma, and Tehama counties.

URBAN SOFT SCALE, *Pulvinaria urbicola* -(Q)-This scale insect was found for the first time at Yorba Linda, **Orange** County, on February 10, 2000 by County Agricultural Commissioner Richard Le Feuvre. The scale was from *Distictis buccinatoria* in a residence garden. This scale has apparently occurred in very low populations in San Diego county for many years, where it is seen only occasionally. There are apparently natural enemies or environmental conditions that must be keeping it in check.

NEW COUNTY RECORDS, continued

REDGUM LERP PSYLLID, *Glycaspis brimblecombei* -(Q)- This serious pest of redgum eucalyptus has been found in a large number of new counties over the summer. It is now found in almost all counties where eucalyptus will grow. The finds are Capella, **Mendocino** County on June 6, 2000 by Jim Xerogeanes, Fort Ord, **Monterey** County on June 26, 2000 by B. Oliver, July 18, 2000 in Moccasin, **Tuolomne** County by N. Reade, February 2, 2000, in Middletown, **Lake** County by Sheryl Gill, and on January 13, 2000, in El Centro, **Imperial** County by Jolene Carson. With new detections occuring frequently, IPM techniques have evolved to battle this problem. UC scientists have been adapting new methods for the control of this eucalyptus pest. An in depth article by Dahlsten et al pertaining to this problem can be found in California Agriculture 54 (6):8-13, Nov-Dec 2000.

PLASTER BAGWORM , *Phereoeca praecox* -(C)- This insect has been in California for many years, first reported in Westminster, Orange County on January 28, 1986. Further collections have been made in **Los Angeles** County on August 26, 1987; Santa Barbara, **Santa Barbara** County on February 25, 1988; Beaumont, **Riverside** County on April 2, 1993; West Sacramento, **Yolo** County on April 20, 1993; and Chino, **San Bernardino** County on September 17,1997.

ICEPLANT SCALE, *Pulvinaria mesembryanthemi* -(C)- This scale insect was found for the first time at Manila, **Humbolt** county. The collection was made by Peter Haggard on November 11, 2000. Distribution of this scale insect is practically state-wide. It is prevalent along the coast from Sonoma County to San Diego, but most common in the east bay region. It is also found inland in Sacramento, Glenn, Solano, Yolo, San Joaquin, Alameda, Contra Costa, Los Angeles, Marin, Napa, San Luis Obispo, Santa Barbara, Santa Cruz, Sonoma, Fresno, Kern, Merced, Calaveras, Orange and San Bernardino counties. It occurs in southern Africa, the Mediterranean region, Australia and Argentina and is apparently native to southern Africa. It is currently under good biological control.

AUSTRALIAN TORTOISE BEETLE, *Trachymela sloanei* -(Q)- This beetle pest was found for the first time in **Yolo** County, at the Dunnigan Rest Area on southbound I-5. The collection was made by Dick Penrose on December 6, 2000. The adults were found under loose bark at the base of a eucalyptus. More information is available in CPPDR 17(1-3):4-6.

PALM LEAF SKELETONIZER, *Homaledra sabalella* -(Q)- This pest was found for the first time in San Diego and Rancho San Diego of **San Diego** County. For additional information see this same topic under New State records on page 29.

ASH MOTH, *Zelleria* sp. -(Q)- This pest of Oregon ash, *Fraxinus latifolia*, was found for the first time in Crescent City and Jedediah Smith State Park near Hiouchi in **Del Norte** County. Additional information on this pest is on page 31.

PYRALID OLEANDER MOTH, *Glyphodes* sp. -(Q)- This pest was found for the first time in Newport Beach, **Orange** County and Coronado, **San Diego** County. For further information on this pest please see same topic on page 30.

Mexican Fruit Fly, *Anastrepha ludens*, -(A)- June-September, 2000 collections

County	City	Date	#M/F/Stage	Trap	Host	Collector(s)
Riverside	Temecula	09/26	1M	McPhail	grapefruit	Bennett
Alameda	Oakland	09/19	1M	McPhail	apple	Sahota

Guava Fruit Fly, *Bactrocera correcta*, -(A)- June-September, 2000 collections

County	City	Date	#M/F/Stage	Trap	Host	Collector(s)
Santa Clara	San Jose	09/15	1M	Jackson	peach	Quintara
Orange	La Palma	08/10	1M	Jackson	plum	Vilanueva
Los Angeles	Norwalk	08/16	1M	Jackson	nectarine	Barrera
Los Angeles	Lakewood	08/07	1M	Jackson	ornamental	Casebeer
Los Angeles	Cerritos	08/08	1M	Jackson	avocado	Barrera
Santa Clara	San Jose	07/07	1M	Jackson	grapefruit	Mc Quilla
Orange	Buena Park	08/24	1M	Jackson	fig	Diaz
Alameda	Fremont	08/23	1M	Jackson	peach	Marciel

Oriental Fruit Fly, *Bactrocera dorsalis* complex, -(A)- June-September, 2000 collections

County	City	Date	#M/F/Stage	Trap	Host	Collector(s)
Los Angeles	Long Beach	07/11	2M	Jackson	ornamental	Rocha
Los Angeles	Long Beach	07/13	1M	Jackson	ornamental	Deluna
Orange	Westminister	09/13	2M	Jackson	orange	Espina
Los Angeles	Lennox	08/28	1M	Jackson	peach	Ortiz
Los Angeles	Hacienda Heights	08/28	1M	Jackson	apple	Deluna
Los Angeles	Lennox	09/30	1M	Jackson	lemon	Gray
Los Angeles	Long Beach	07/12	1M	Jackson	ornamental	Deluna
Los Angeles	Canoga Park	06/13	1M	Jackson	ornamental	Dominguez
Solano	Dixon	06/19	1M	Jackson	loquat	Pinfold
Los Angeles	Hacienda Heights	08/22	1M	Jackson	pear	Aquino
Los Angeles	Long Beach	08/18	3M	Jackson	orrange	Deluna
Orange	Orange	06/29	1M	Jackson	plum	Marroquin
Los Angeles	Rancho Park	07/26	1M	Jackson	peach	Delgado
Los Angeles	Long Beach	08/11	3M	Jackson	orange	Gonzales

Olive Fruit Fly , Bactrocera oleae,- (A)- June-September, 2000 collections

County	City	Date	#M/F/Stage	Trap	Host	Collector(s)
San Luis Obispo	San Luis Obispo	06/05-07	7M	Champ	olive	Chadwick
San Luis Obispo	Nipomo	06/05	4M	Champ	olive	Amand/Nowell
San Luis Obispo	Arroyo Grande	06/05	1F	Champ	olive	Amand
Kern	Bakersfield	06/	3M/1F	Champ	?	Pryor/Wilson
Tulare	Lindsay	06/07	1M	Champ	olive	Alamo
Tulare	Porterville	06/07	1M	Champ	olive	Adams
Tulare	Terra Bella	06/07	1M	McPhail	grapefruit	dela Cruz
Tulare	Visalia	06/07	1F	Champ	olive	Martin
Alameda	Fremont	07/05	1M	Champ	olive	Colombo
Tulare	Visalia	07/05	1F	Champ	olive	Martin
Tulare	Dinuba	07/07	1F	Champ	olive	Martin
Tulare	Porterville	07/07	1F	Champ	olive	Adams
Tulare	Porterville	07/07	1F	Champ	olive	Adams
Santa Clara	San Jose	07/07	1M	Champ	orange	Ruby
Tulare	Porterville	07/07	1F	Champ	olive	Adams
Tulare	Ivanhoe	07/07	1F	Champ	olive	Martin
Kern	Bakersfield	07/07	1F	McPhail	orange	Shinn
Tulare	Orange Cove	07/10	1F	Champ	olive	Martin
Tulare	Poplar	07/10	1F	Champ	olive	Adams
Kern	Bakersfield	07/10	1M	Champ	olive	Borrego
Tulare	Plainview	07/10	1F	Champ	olive	Pearson
Tulare	Terra Bella	07/11	1F	Champ	olive	Adams
Tulare	Cutler	07/12	1F	Champ	olive	Martin
Tulare	Orosi	07/12	1F	Champ	olive	Martin
Tulare	Ducor	07/12	1F	Champ	olive	Adams
Tulare	Terra Bella	07/13	1F	Champ	olive	Adams
Madera	Madera	07/14	1M	Champ	olive	Whatley
Fresno	Fresno	07/14	1F	Champ	olive	Johnson
Tulare	Strathmore	07/17	1F	Champ	olive	Adams
Tulare	Lindsay	07/17	1F	Champ	olive	Adams
Fresno	Fresno	07/17	1M	Champ	olive	Dickey
Fresno	Fresno	07/17	1M	Champ	olive	Johnson
Fresno	Fresno	07/17	1M	Champ	olive	Dickey
Madera	Madera	07/18	1M	Champ	olive	Weikel
Fresno	Fresno	07/18	1M	Champ	olive	Dickey
Fresno	Clovis	07/18	1M	Champ	olive	Dickey
Fresno	Fresno	07/19	1M	Champ	olive	Dickey
Alameda	Sunol	07/19	1M	Champ	olive	Mailho
Alameda	Sunol	07/19	1M	Champ	olive	Colombo

Olive Fruit Fly , Bactrocera oleae,- (A)- June-September, 2000 collections

County	City	Date	#M/F/Stage	Trap	Host	Collector(s)
Tulare	Lindsay	07/17	1F	Champ	olive	Adams
Alameda	Sunol	07/19	1M	Champ	olive	Colombo
Tulare	Strathmore	07/19	1F	Champ	olive	Adams
Tulare	Visalia	07/20	1F	Champ	olive	Martin
Tulare	Lindsay	07/20	1F	Champ	olive	Pearson
Tulare	Lindsay	07/20	1F	Champ	olive	Pearson
Fresno	Fresno	07/20	1M	Champ	olive	Johnson
Fresno	Reedley	07/20	1M	Champ	olive	Dickey
Fresno	Fresno	07/20	1M	Champ	olive	Johnson
Fresno	Selma	07/20	1M	Champ	olive	Dickey
Kern	Delano	07/21	1M	Champ	olive	Borrego
Fresno	Reedley	07/20	1M	Champ	olive	Dickey
Fresno	Selma	07/20	1M	Champ	olive	Dickey
Fresno	Reedley	07/20	1F	Champ	olive	Dickey
Fresno	Clovis	07/21	1F	Champ	olive	Johnson
Fresno	Sanger	07/21	1F	Champ	olive	Dickey
Kern	Delano	07/21	1F	Champ	olive	Borrego
Fresno	Clovis	07/21	1M	Champ	olive	Johnson
Tulare	Exeter	07/21	1F	Champ	olive	Pearson
Tulare	Exeter	07/21	1F/1M	Champ	olive	Pearson
Tulare	Strathmore	07/21	1F	Champ	olive	Alamo
Tulare	Porterville	07/21	1F	Champ	olive	Adams
Fresno	Clovis	07/24	1M	Champ	olive	Dickey
Fresno	Malaga	07/24	1M	Champ	olive	Johnson
Tulare	Terra Bella	07/24	1F	Champ	olive	Adams
Tulare	Exeter	07/24	1F	Champ	olive	Alamo
Fresno	Clovis	07/24	1M	Champ	olive	Dickey
Fresno	Fresno	07/24	1M	Champ	olive	Johnson
Fresno	Clovis	07/24	1F	Champ	olive	Dickey
Tulare	Porterville	07/24	1F	Champ	olive	Adams
Fresno	Sanger	07/24	1M	Champ	olive	Dickey
Fresno	Orange Cove	07/25	1F	Champ	olive	Dickey
Fresno	Orange Cove	07/25	1M	Champ	olive	Dickey
Tulare	Dinuba	07/25	1F	Champ	olive	Martin
Tulare	Ducor	07/26	1F	Champ	olive	Adams
Alameda	Livermore	07/26	1M	Champ	olive	Colombo
Tulare	Terra Bella	07/25	1F	Champ	olive	Adams
Fresno	Fresno	07/25	1M	Champ	olive	Johnson

Olive Fruit Fly , Bactrocera oleae,- (A)- June-September, 2000 collections

County	City	Date	#M/F/Stage	Trap	Host	Collector(s)
Fresno	Reedley	07/28	1M	Champ	olive	Collins
Fresno	Reedley	07/28	1F	Champ	olive	Collins
Fresno	Clovis	07/27	1M	Champ	olive	Johnson
Tulare	Lindsay	07/27	1F	Champ	olive	Pearson
Tulare	Lindsay	07/28	1F	Champ	olive	Adams
Kern	Shafter	07/28	1M	Champ	olive	Wonderly
Kern	Shafter	07/28	1M	Champ	olive	Wonderly
Madera	Madera	07/31	1F	Champ	olive	Weikel
Tulare	Lindsay	07/31	1F	Champ	olive	Adams
San Bernadino	Ontario	08/01	1F	McPhail	peach	Stevenson
Madera	Madera	08/01	1M	Champ	olive	Weiker
Alameda	Livermore	08/02	1M	Champ	olive	Colombo
Tulare	Woodlake	08/02	1F	Champ	olive	Martin
Tulare	Plainview	08/02	1F	Champ	olive	Adams
Tulare	Plainview	08/02	1F	Champ	olive	Adams
Tulare	Exeter	08/03	1F	Champ	olive	Pearson
Kern	McFarland	08/04	2M	Champ	olive	Borrego
Madera	Madera	08/07	1M	Champ	olive	Kato
Tulare	Seville	08/07	1M	Champ	olive	Martin
Sutter	Yuba City	08/07	1M	Champ	olive	Hanna
Madera	Madera	08/14	1M	Champ	olive	Weikel
Tulare	Orange Cove	08/14	1F	Champ	olive	Martin
Tehema	Corning	08/17	1M	Champ	olive	Alexander
Tulare	Lindsay	07/21	1M	Champ	olive	Alamo
Tulare	Woodlake	07/24	1M	Champ	olive	Alamo
Kern	Bakersfield	08/14	1M	McPhail	orange	Moreno
Alameda	Pleasanton	08/16	1M	Champ	olive	Seslowe
Alameda	Livermore	08/17	1M	Champ	olive	Colombo
Kern	Delano	08/18	1M	Champ	olive	Borrego
Kern	Kelano	08/18	1M	Champ	olive	Borrego
Kern	Bakersfield	08/21	1M	McPhail	orange	Moreno
Madera	Madera	08/22	1M	Champ	olive	Whatley
San Luis Obispo	Cuyama	08/24	1M	Champ	olive	Perez
Kern	Maricopa	08/31	1M	McPhail	orange	Bird
Kern	Taft	08/31	1F	McPhail	grapefruit	Bird
Kern	Bakersfield	09/05	1M	McPhail	grapefruit	Moreno
Fresno	Orange Cove	09/11	1F	Champ	olive	Dickey
Kern	Shafter	09/11	1F	Champ	olive	Wonderly

Olive Fruit Fly , Bactrocera oleae,- (A)- June-September, 2000 collections

County	City	Date	#M/F/Stage	Trap	Host	Collector(s)
Alameda	Sunol	09/05	1M/2F	Champ	olive	Mailho
Alameda	Sunol	09/05	1F	Champ	olive	Elhashash
Madera	Madera	09/05	1F	Champ	olive	Whatley
Alameda	Livermore	09/06	1M	Champ	olive	Colombo
Tulare	Ultra	09/06	1M	McPhail	peach	dela Cruz
Tulare	Seville	09/08	1F	McPhail	fig	dela Cruz
Kern	Maricopa	09/08	1M	McPhail	orange	Bird
Kern	Shafter	09/11	1M/1F	Champ	olive	Wonderly
Fresno	Fresno	09/11	1M	Champ	olive	Dickey
Fresno	Orange Cove	09/12	1M/1F	Champ	olive	Dickey
Fresno	Orange Cove	09/12	1F	Champ	olive	Dickey
Fresno	Orange Cove	09/12	1M	Champ	olve	Dickey
Sutter	Yuba City	09/14	1M	Champ	olive	Hanna
Fresno	Clovis	09/14	1M	Champ	olive	Johnson
Alameda	Livermore	09/14	1F	Champ	olive	Colombo
Fresno	Orange Cove	09/15	1M	Champ	olive	Dickey
Kern	McFarland	09/15	1M	Champ	olive	Borrego
Kern	Delano	09/15	2M	Champ	olive	Borrego
Kern	Delano	09/15	2M	Champ	olive	Borrego
Madera	Madera	09/12	1F	Champ	olive	Whatley
Kern	Bakersfield	09/15	1F	McPhail	grapefruit	Shinn
Kern	Bakersfield	09/15	1M	Champ	olive	Borrego
Fresno	Clovis	09/18	1M	Champ	olive	Dickey
Madera	Madera	09/18	1M	Champ	olive	Weikel
Madera	Madera	09/18	1M	Champ	olive	Aguilar
Santa Clara	San Jose	09/19	1M	Champ	oak	Cervantes
Alameda	Pleasanton	09/19	1M	Champ	olive	Vorous
Alameda	Pleasanton	09/19	2M	Champ	olive	Vorous
Madera	Madera	09/19	1M	Champ	olive	Whatley
Madera	Madera	09/19	1M	Champ	olive	Llanes
Madera	Fairmead	09/19	1M	Champ	olive	Weikel
Kern	Fellows	09/20	2L	Champ	olive	Fellows
Monterey	Momt	09/26	1M	McPhail	fig	Sutiom
Kern	Shafter	09/26	1M	Champ	olive	Wonderly
Kern	Shafter	09/26	1F	Champ	olive	Wonderly
Kern	Shafter	09/26	2M	Champ	olive	Wonderly
Fresno	Clovis	09/27	1M	Champ	olive	Dickey
Alameda	Livermore	09/05	1M	Champ	olive	Colombo

Olive Fruit Fly , Bactrocera oleae,- (A)- June-September, 2000 collections

County	City	Date	#M/F/Stage	Trap	Host	Collector(s)
Fresno	Orange Cove	09/27	1M	Champ	olive	Dickey
Fresno	Orange Cove	09/27	1M	Champ	olive	Dickdy
Fresno	Orange Cove	09/27	1F	Champ	olive	Dickey
Kern	Bakersfield	09/28	1F	McPhail	grapefruit	Shinn
Kern	Bakersfield	09/28	1M/2F	McPhail	grapefruit	Shinn
Santa Clara	San Jose	09/27	1M	Champ	olive	Huyhn
Tulare	Tulare	09/28	1F	Champ	olive	Sibbitt
Fresno	Orange Cove	09/28	1M	Champ	olive	Dickey
Fresno	Orange Cove	09/28	2M	Champ	olive	Dickey
Fresno	Fresno	09/28	1M	Champ	olive	Johnson
Fresno	Orange Cove	09/28	1F	Champ	olive	Dickey
Kern	Bakersfield	09/29	1M	Champ	olive	Borrego
Kern	McFarland	09/29	4M	Champ	olive	Borrego
Madera	Madera	09/29	1M	Champ	olive	Whatley
Fresno	Orange Cove	09/29	1M	Champ	olive	Dickey
Fresno	Reedley	09/29	1F	Champ	olive	Dickey

Japanese Beetle, *Popollia japonica*, -(A)- June-September, 2000 collections

County	City	Date	#M/F/Stage	Trap	Host	Collector(s)
Los Angeles	Burbank	08/18	1M	JB		Castillo
San Diego	San Diego	08/16	1M	JB	Turf	Wube
Los Angeles	Hawthorne	08/03	1M	JB		Chung/Tran
Los Angeles	Los Angeles	08/07	1 adult	JB		Cordova
Los Angeles	Santa Monica	08/03	1M	JB		Chung/Tran
Sacramento	Sacramento	08/18	1 adult	JB		Downing
Orange	Irvine	09/20	1F	JB		Drake
Santa Clara	San Jose	08/11	1F	JB		Banzon
Alameda	Oakland	08/17	2F	JB		Franke/Shankland
Alameda	Oakland	07/20	1F	JB		Franke
Los Angeles	Los Angeles	07/18	1F	JB		Cordova
San Diego	San Marcos	08/08	1F/1M	JB		Armendariz
Santa Clara	San Jose	09/08	1 adult	JB		De Borba
Los Angeles	Los Angeles	07/25	1F	JB		Cordova
Los Angeles	Los Angeles	07/26	1F	JB		Cordova
Los Angeles	Burbank	09/28	1M	JB		Viray
Los Angeles	Los Angeles	08/07	I adult	JB		Cordova

Gypsy Moth, *Lymantria dispar*, -(A)- June-September, 2000 collections

County	City	Date	#M/F/Stage	Trap	Host	Collector(s)
San Diego	Fallbrook	07/24	1M	Delta GM	Oak	White
Marin	Novato	07/19	1M	Delta GM		Hughes
Marin	Novato	07/21	1M	Delta GM		Valenzuela
Marin	Novato	07/21	1F		birdhouses	Frons
Marin	Novato	07/21	1M	Delta GM		Main
Marin	Novato	07/19	1M	Delta GM		Valenzuela
San Diego	Fallbrook	07/20	1M	Delta GM	oak	White
Marin	Novato	07/19	1M	Delta GM		Main
San Mateo	Woodside	07/18	1M	Delta GM	oak	Banzon
Marin	Novato	07/14	1M	Delta GM		Main
Marin	Novato	07/14	1M	Delta GM		Main
Marin	Novato	07/13	2M	Delta GM		Thompson
Marin	Novato	07/07	2M	Delta GM	ornamental	Main
Ventura	Meiners Oaks	07/06	2M	Delta GM	pine	Battleson
San Diego	Bonsall	07/11	1M	Delta GM	eucalyptus	Robinson
San Diego	Fallbrook	07/06	2M	Delta GM	oak	White
San Diego	Fallbrook	06/26	2M	Delta GM	liquid amber	Armendariz
Orange	Laguna Beach	07/25	1M	Delta GM	eucalyptus	Casas
San Mateo	Woodside	07/25	1M	Delta GM		Banzon
Marin	Novato	07/25	1M	Delta GM		Thompson
Marin	Novato	07/24	2M	Delta GM		Valenzuela
Marin	Novato	07/21	1M	Delta GM		Hughes
Sacramento	Carmichael	08/03	1M	Delta GM	shade tree	Cuny
Marin	Novato	08/03	1M	Delta GM	oak	Thompson
Marin	Novato	08/09	1M	Delta GM		Thompson
Shasta	Cottonwood	08/16	1M	J.B trap		Ningst
Los Angeles	Duarte	08/14	1M	Delta GM	tree	Alaniz
Marin	Novato	08/14	2M	Delta GM		Main
Marin	Novato	07/14	2M	Delta GM		Main
Yolo	West Sacramento	07/27	1M	panel trap	apple	Patterson

EXCLUSION

Several pest species that are not established in the state are collected every year on incoming or newly arrived nursery stock or similar quarantine situations. The following are examples of rated pests found since June, 2000.

CITRUS SNOW SCALE, *Unaspis citri* -(A)- Found on January 4 in Union City, Alameda County, on curry leaves.

JASMINE WHITEFLY, *Aleuroclava jasmini* -(Q)- Found on January 19 at a nursery in Anaheim, Orange County, on *Gardenia jasminoides.*

The following pages 42 to 43 indicate a few of the many quarantine interceptions made during the year. This is a random selection of pest species chosen to indicate to quarantine officials and inspectors as to what pest species are currently being intercepted in quarantine shipments around the state.

Important "A", "B", and "Q" Rated Arthropods and Mollusks Intercepted in Quarantine
June through September 2000

Rating	Species	Common Name	Date	Origin	County	Host	Collector(s)
Q	*Kallitaxila granulata*	a planthopper	11/17/99	Hawaii	RIV	orchid	Chandler
Q	*Coccus moestus*	a soft scale	11/15/99	Hawaii	SFO	*Neanthebella*	Naicker
A	*Hemiberlesia palmae*	tropical palm scale	11/18/99	Florida	SLO	?	Focha
Q	*Oxydema* sp.	a weevil	11/15/99	Hawaii	SON	*Cocos nucifera*	Albers
Q	*Geotomus pygmaeus*	a burrowing bug	11/24/99	Hawaii	SON	orchid	Bryant
A	*Melanaphis sacchari*	an aphid	12/28/99	?	CCA	*Saccharum officinarum*	Fonseca
A	*Hemiberlesia palmae*	tropical palm scale	02/08/00	Florida	SON	*Neorogelia* sp.	Bryant
A	*Hemiberlesia palmae*	tropical palm scale	10/21/99	Florida	CCA	*Cordyline terminalis*	Vargas
A	*Aonidiella orientalis*	oriental scale	12/03/99	Florida	BUT	*Cocos nucifera*	Pejsa
Q	*Aspidiotus cryptomeriae*	an armored scale	12/28/99	New Hampshire	LAK	*Abies balsamea*	Tritchler
Q	*Scudderia* sp.	a katydid	12/21/99	Hawaii	RIV	*Linum* sp.	Chandler
A	*Aspidiotus destructor*	coconut scale	12/22/99	Costa Rica	RIV	*Phoenix roebelenii*	Chandler
Q	*Aleurotulus anthuricola*	anthurium whitefly	12/23/99	Hawaii	RIV	*Anthurium* sp.	Chandler
Q	*Abgrallaspis ithacae*	hemlock scale	12/14/99	Maine	ORA	*Abies balsamea*	Bennett
A	*Phyllocnistis citrella*	citrus leafminer	12/09/99	Florida	SBD	*Citrus* sp.	Williams
Q	*Tetranychus* sp.	a tetranychid mite	12/20/99	Florida	SJQ	*Ravenea rivularis*	Curtoni
Q	*Puto mexicanus*	Mexican giant mealybug	12/10/99	Mexico	SFO	*Crataegus* sp.	Naicker
Q	*Pseudococcus jackbeardsleyi*	a mealybug	12/08/99	Hawaii	SMT	*Zingiber* sp.	Simon
B	*Protopulvinaria pyriformis*	pyriform scale	12/09/99	Costa Rica	SJQ	*Schefflera* sp.	Lansigan
B	*Ferrisia virgata*	striped mealybug	12/09/99	Costa Rica	SJQ	*Schefflera* sp.	Lansigan
Q	*Wasmannia auropunctata*	an ant	12/04/99	Florida	SBA	*Zingiber* sp.	Burke
A	*Ceroplastes rusci*	fig wax scale	12/28/99	Florida	SCL	*Ficus benjamina*	Fairbanks
A	*Trioza tripunctata*	blackberry psyllid	12/21/99	Maine	SHA	*Abies balsamea*	Moen
B	*Phytomyza ilicis*	holly leafminer	12/09/99	Washington	ARPT	*Ilex* sp.	Stevenson
Q	*Palmaspis* sp.	a palm pit scale	12/17/99	Chile	YUB	*Jubaea chilensis*	Storm
Q	*Palmaspis* sp.	a palm pit scale	12/17/99	Chile	YUB	*Jubaea chilensis*	Storm
A	*Rhagoletis* sp.	a fruit fly	12/19/99		CLMP	*Crataegus pubescens*	Young
B	*Phytomyza ilicis*	holly leafminer	12/16/99	Oregon	ARPT	*Ilex* sp.	Cochrane
A	*Cydia caryana*	hickory shuckworm	12/21/99	Mississippi	ARPT	*Carya illinoinensis*	Sharma
A	*Cydia caryana*	hickory shuckworm	12/21/99	Georgia	ARPT	*Carya illinoinensis*	Sharma
Q	*Patosia* sp.	a scarab beetle	01/27/00	Taiwan	CCA	package of screws	Donlon
Q	*Syngrapha rectangula*	a plusiine looper	12/31/99	Pennsylvania	HUM	*Abies balsamea*	Spadoni
A	*Anastrepha ludens*	mexican fruit fly	11/24/99	Mexico	?	*Citrus aurantifolia*	Price
A	*Anastrepha* sp.	an exotic fruit fly	12/02/99	Mexico	?	*Citrus aurantifolia*	Goh
A	*Coccus viridis*	green scale	12/02/99	Hawaii	SCL	*Citrus limon*	Barrera

Important "A", "B", and "Q" Rated Arthropods and Mollusks Intercepted in Quarantine June through September 2000

Rating	Species	Common Name	Date	Origin	County	Host	Collector(s)
A	*Curculio caryae*	pecan weevil	12/16/99	Georgia	?	*Carya illinoinensis*	Daily
A	*Curculio caryae*	pecan weevil	12/21/99	Mississippi	?	*Carya illinoinensis*	Sharma
Q	*Diploptera punctata*	pacific beetle cockroach	01/26/00	Hawaii	SDG	cut greens	Flemming
Q	*Aulacizes* sp.	a leafhopper	01/19/00	Florida	SAC	*Asparagus plumosa*	Hightower
Q	*Meghimatium striatum*	a slug	01/13/00	Hawaii	LAX	*Dracaena* sp.	Regis/Dias
B	*Siphanta acuta*	torpedo bug	01/18/00	Hawaii	LAX	cut flowers	Carrillo
A	*Aonidiella orientalis*	oriental scale	01/17/00	New York?	TUL	Khat	McHugh
A	*Anomala orientalis*	oriental beetle	02/01/00	Hawaii	ALA	*Ananas comosus*	Sum
Q	*Orchidophilus* sp.	a weevil	02/21/00	Hawaii	LAX	orchid	Ruse
A	*Phyllocnistis citrella*	citrus leafminer	02/22/00	Louisiana	SDG	*Fortunella* sp.	Ginsky
B	*Ferrisia virgata*	striped mealybug	02/11/00	Costa Rica	SDG	*Draceana* sp.	Worcester
B	*Araecerus coffeae*	coffee bean weevil	02/03/00	China	SDG	*Citrus* sp.	Feeley
Q	*Aleurotulus anthuricol*	anthurium whitefly	02/14/00	Hawaii	RIV	*Anthurium* sp.	Chandler
A	*Aonidiella orientalis*	oriental scale	?	Florida	SFO	pony tail palm	Lino
A	*Aspidiotus destructor*	coconut scale	02/16/00	Florida	SMT	*Eugenia* sp.	Ventura
B	*Ceroplastes sinensis*	chinese wax scale	02/23/00	Florida	SFO	*Strelitzia* sp.	Lino
Q	*Opuntiaspis carinata*	an armored scale	?	Florida	SFO	pony tail palm	Lino
A	*Parlatoria proteus*	sansevieria scale	?	Florida	SFO	pony tail palm	Lino
Q	*Camponotus* sp.	a carpenter ant	02/07/00	Florida	SMT	*Zingiber* sp.	Rodriguez
A	*Ceroplastes rusci*	fig wax scale	02/15/00	Florida	SMT	*Carmona* sp.	Melo
Q	*Hemiberlesia ocellata*	an armored scale	02/24/00	Ecuador	?	*Musa* sp.	Hernandez
A	*Lymire edwardsii*	a ctenuchine moth	02/18/00	Florida	SCL	*Ficus benjamina*	Barrera
A	*Malocosoma americanum*	eastern tent caterpillar	03/21/00	Massachusettes	ALA	work bench	Roache
Q	*Odontomachus* sp.	an ant	02/15/00	Florida	SCL	*Chamaedorea cataractarum*	Fairbanks
Q	*Philomycus carolinianus*	a slug	02/12/00	Florida	SMT	*Heliconia* sp.	Rodriguez
A	*Pinnaspis buxi*	boxwood scale	03/16/00	Hawaii	ALA	hawaiian tropicals	Walter
Q	*Sybra alternans*	a longhorn beetle	02/05/00	Hawaii	SMT	*Ananas comosus*	Rodriguez
Q	*Pseudaonidia trilobitiformes*	a trilobe scale	02/18/00	Florida	SCL	*Ficus benjamina*	Fairbanks
Q	*Stenotrupis* sp.	a cossonine weevil	02/08/99	Hawaii	SHA	*Cordyline terminalis*	Moen
Q	*Fiorinia* sp.	an armored scale	02/04/00	Thailand	SON	*Citrus histrix*	Bryant
Q	*Aleurodicus dispersus*	spiraling whitefly	03/23/00	Hawaii	SON	*Strelitzia* sp.	Vingua
Q	*Aleurodicus dispersus*	spiraling whitefly	02/09/00	Hawaii	SON	orchid	Bryant
Q	*Aleurotrachelus* sp.	a whitefly	03/09/00	Hawaii	LAX	*Piper betle*	Ruse
Q	*Pinnaspis uniloba*	unilobed scale	02/18/00	Hawaii	ORA	*Alyxia olivaeformes*	Fernandez
A	*Clavaspis herculeana*	herculaena scale	03/13/00	Hawaii	ORA	*Plumeria* sp.	Nestor

SIGNIFICANT FINDS OTHER STATES

A WEEVIL, *Myllocerus* sp. -(Q)- Recently in Boward County, Florida a new economically important pest has been found. This weevil (fig. 10A), new to the Western Hemisphere, has been collected from multiple localities in and around the Ft. Lauderdale area. It is evident that this pest from India has become established in these areas.

Literature records suggest this weevil has an extremely broad host range. Indian literature includes, rice, maize, pigeonpea, cotton, jute, sunflower, mango, pomegranate, strawberry, apple, lucern, *Dalbergia sisoo*, daincha, and *Imperata arundinacea*. Thus far, Florida records include: lychee (*Litchee chinensis*), longan (*Euphoria longana*), mamey (*Mammee sapota*), areca palms (*Dypis lutescens*), hibiscus (*Hibiscus rosa-sinensis*), Australian bush-cherry (*Syzygium paniculatum*), cocoplum (*Chrysobalanus icaco*), crepe myrtle (*Lagerstroemia indica*), and tropical almond (*Terminalia catappa*) (fig. 10B).

The weevil is superficially similar to the native *Artipus floridanus* Horn in size at 7-8 mm long, and its general whitish-grey coloration. However, it differs in many details, the most conspicuous of which is the dark mottling of the upper surface (fig. 10C), and the yellowish head. All the femora are spined (fig. 10D), unlike *A. floridanus*, in which none of the femora are spined.

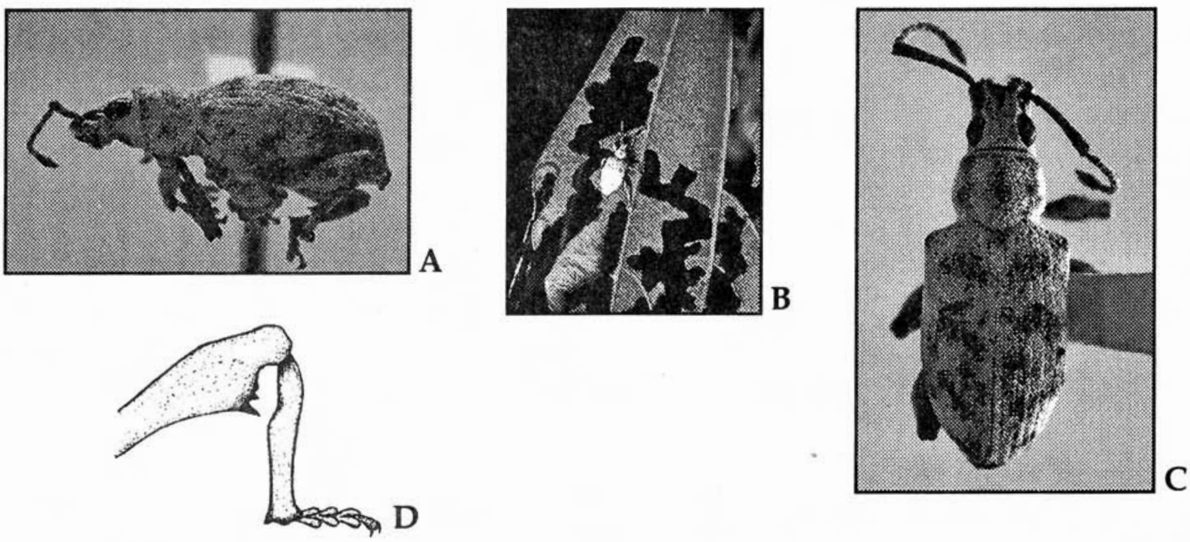

Fig. 10 *Myllocerus* sp. A. lateral view. B. damage to tropical almond. C. dorsal view. D. femoral spines of hind leg.

SOYBEAN APHID, *Aphis glycines* -(Q)- This aphid was recently detected on August 1, 2000. A native of Asia, it has been observed in northern Illinois, Michigan, and Wisconsin. Presently it is unknown how long it has been present in the United States. The soybean aphid is one of the few aphid species known to attack soybeans specifically as a primary host. It is similar in appearance to the cotton/melon aphid (*Aphis gossypii*), and may be a vector of several plant viruses, including abaca or cucumber mosaic, soybean mosaic, soybean stunt, beet mosaic, bean yellow mosaic, Indonesian soybean dwarf, and peanut mottle virus, but no exotic viruses are known to be transmitted at this time. Soybean stem apices and young leaves are colonized

SIGNIFICANT FINDS OTHER STATES, cont.

early in the season and adults occur on undersides later in the season. *Pueraria javanica* and *Desmodium intortum* have been observed as secondary hosts of this pest. The winged sexual forms migrate to winter host such as *Rhamnus* spp., or buckthorn, and lay dark-colored eggs that overwinter.

DIAPREPES ROOT WEEVIL, *Diaprepes abbreviatus* -(A)- Wreaking havoc on Floridas citrus trees is a pest known to many growers as the "evil weevil"(front cover). This pest is in almost every citrus producing county in Florida, slowly destroying citrus tree root stock. The diaprepes root weevil (front cover) can remain a hidden pest in a citrus grove for up to four years before a grower knows that there is a problem. The larvae feed on tree roots resulting in death when the structural root or root crown is girdled. Aside from the effects of girdling, tree fitness declines over time as primary roots are damaged and infected by root rot pathogens. Until sometime around October 5, 2000, Florida was the only state in the nation infested with diaprepes.

Diaprepes root weevil has been identified recently from Texas, but the extent of its occurrence is not yet known. In "The Texas A&M University System" web page (http://primera.tamu.edu/stories/10-05-2000.htm) it is stated that trees showing symptoms of infestation by diaprepes root weevil have been found in La Feria and Los Fresnos, Texas. Some other trees located along a corridor parallel to U.S. Highway 281 nearer to Weslaco, have also succumbed.

Hopefully, the extent of the infestation in Texas will be determined in the next few months as the result of trapping efforts by USDA/APHIS and others.

Florida growers have had to learn to live with it over the last three or so decades, while also incurring substantial additional costs for pesticidal control efforts that, to date, have not been as successful as hoped. Indeed, most believe that diaprepes root weevil will ultimately spread to all citrus production areas in Florida, despite decades of trying to control the beast.

PLANT PATHOLOGY HIGHLIGHTS

List of North American oaks assumed to be at-risk for Sudden Oak Death. (*Quercus* Linnaeus section *Lobatae* Loudon, Hort. Brit. 385. 1830. Red or black oaks. (after Richard J. Jensen).)

Oak species (* indicates California species)	***Geographic range***
Quercus acerifolia	
Quercus agrifolia *	California
Quercus arkansana	e Texas to Georgia
Quercus buckleyi	
Quercus coccinea	
Quercus ellipsoidalis	
Quercus emoryi	Arizona to w Texas
Quercus falcata	
Quercus georgiana	
Quercus graciliformis	
Quercus gravesii	
Quercus hemisphaerica	
Quercus hypoleucoides	Arizona to w Texas
Quercus ilicifolia	North Carolina to Maine
Quercus imbricaria	
Quercus incana	Texas to North Carolina
Quercus inopina	Florida
Quercus kelloggii *	California to Oregon
Quercus laevis	
Quercus laurifolia	
Quercus marilandica	
Quercus myrtifolia	Mississippi to S. Carolina
Quercus nigra	
Quercus pagoda	
Quercus palustris	
Quercus parvula *	
Quercus phellos	
Quercus pumila	Mississippi to N. Carolina
Quercus robusta	w Texas
Quercus rubra	Oklahoma to Nova Scotia
Quercus shumardii	
Quercus tardifolia	w Texas
Quercus texana	
Quercus velutina	
Quercus viminea	sc Arizona
Quercus wislizeni *	California

PLANT PATHOLOGY HIGHLIGHTS

SUDDEN OAK DEATH

For the past several years Sudden Oak Death (SOD) has been causing a lot of concern in California among foresters, environmentalists, concerned citizens and home owners. Many oaks have died suddenly, including the stately coast live oak (*Quercus agrifolia)*, and tanoak (tanbark oak)(*Lithocarpus densiflorus)*. Only recently has a causative agent been identified. It is a new species of *Phytophthora*. One thing that is unusual is that many *Phytophthora* species attack roots, but this one attacks the trunk and larger branches instead. The diagnostic work and pathogen identification has been conducted by Dr. David Rizzo, Plant Pathologist at U.C. Davis. Credit is due Dr. Rizzo for his accomplishments and it is through his work that this information is presented here. Though basically unpublished, we are including information here in order to inform other interested parties about the current facts and concerns about SOD.

Along with the work of Dr. Rizzo, it was noted by Dr. Clive Brasier, a European visitor to Dr. Rizzo's lab that the *Phytophthora* in question resembled a species affecting rhododendrons in northwestern Europe. Subsequently Dr. Rizzo was able to isolate the SOD pathogen from a rhododendron plant in Santa Cruz County. The infected plant was within close proximity to severely SOD affected tanoak trees. This find has prompted a search for infected rhododendrons in commercial rhododendron nurseries in west-central California by CDFA. The severity of SOD on some of our important trees and the unexpected findings of apparently the same pathogen on rhododendrons (based on DNA studies) has resulted in a number of political issues, including proposed quarantines of various California commodities and nursery stock by other states. The disease has also been isolated from Huckleberry, *Vaccinium* sp.

The California Oak Mortality Task Force has been formed in an attempt to find answers to some of the questions about the disease itself with the hope of finding a cure for the problem. There is also a web page available for more information on SOD by Dr. D Rizzo et.al. (www.suddenoakdeath.org). Only certain oaks seem to be infected, and so far, only coastally from Santa Cruz County north to Marin County. See the map on page 48 for the current known distribution. On page 46, there is a list of those oak species that are currently known to be suseptible and those oaks that likely should be susceptible under the right conditions, not only in California, but in other parts of the United States. Also included on pages 58-65 are maps of the distribution of the California susceptible oak species. On page 48 is the current known range of SOD.

With the discovery of the SOD pathogen in rhododendron, discussion at the CDFA Plant Pest Diagnostics lab centered on the possible origins of the disease, since the rapid decline and death of the infected trees indicated that the disease is very likely introduced from somewhere else. And since the disease seems to be restricted to the central California coastline, and that only certain oak species appear to be susceptible, a hypothesis on the likely origin of SOD was postulated by members of the laboratory staff and is presented here starting on page 49.

PLANT PATHOLOGY HIGHLIGHTS

This hypothesis is published here on pages 49 to 57. Remember that it is just a hypothesis, waiting to be proven one way or another. But certain pertinant facts dealing about SOD used in the formulation of the hypothesis are very important bits of information that need to be discussed. So the formal hypothesis is presented here in its entirety.

Origin of the Sudden Oak Death (SOD) pathogen and its potential impact: a working hypothesis

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Abstract

A hypothesis that may explain the origin of the pathogen causing Sudden Oak Death (SOD) and its evolutionary-ecological factors is proposed. Under the assumed scenario, the previously undescribed *Phytophthora* implicated in this oak disease may have coevolved with *Rhododendron* species in the Oriental/Himalayan region. The fungus was brought to Europe, and then probably to the Pacific Northwest of North America before arriving in California, through *Rhododendron* movement. In California, the pathogen infects red oaks (*Quercus agrifolia, Quercus kelloggii*) and Tanoak (*Lithocarpus*), which have little resistance and are severely affected, showing quick mortality. White oaks (*Quercus* section *Quercus*) do not appear to be affected in Europe or California, and may have developed resistance through historical Asiatic contact. Intermediate oaks (*Quercus* section *Protobalanus*) are also unaffected. The fact that another red oak, *Quercus wislizenii*, has thus far not been affected may indicate that climatic factors, such as cool moist conditions similar to those in the area where the pathogen may have originated, may limit transmissibility. If so, the ultimate distribution of the disease would be limited to susceptible species growing in coastal, summer fog areas. However, if the pathogen can be transmitted in warm-moist conditions, red oak species in the Southeastern U.S. may be at risk. Several suggestions for testing this hypothesis and its scenario are presented.

It is possible that the fungal pathogen, a previously unknown *Phytophthora*, that is responsible for Sudden Oak Death (SOD) is an evolutionarily new and randomly mutated agent; in which case little predictability might be possible for its potential actions. Alternatively, the following scenario is presented as a working hypothesis on the origin of the SOD pathogen, and its potential impact. Questions and counter-arguments should be directed to John Sorensen (CDFA-PPDB).

This working hypothesis employs assumptions and principles (Appendix 1) based on coevolution of exploitive agents (parasites, pathogens) and their hosts, as well as biogeographic vicariance of the hosts, and devises the scenario below. The scenario is tentative. If the hypothesis is correct, extensions are possible, again based upon the assumptions and principles presented in Appendix 1. These extensions are testable, as noted. The term lineage is used herein to imply a phylogenetic group, either a clade (monophyletic) or grade (paraphyletic) assemblage. Oak systematics follows Morin (1997), which recognizes three sections within *Quercus*, as occurring in the Nearctic: (a) *Quercus* section *Quercus* (QsQ), the white oaks; (b) *Quercus* section *Lobatae* (QsL), the red or black oaks; and (c) *Quercus* section *Protobalanus*, the golden or intermediate oaks

Scenario

The pathogen probably developed and coevolved on *Rhododendron* in the Oriental/ Himalayan region (Appendix 1: 2). It shows a relative non-virulence on *Rhododendron*, whose speciation epicenter is that region.

Rhododendron breeders probably transported the pathogen on *Rhododendron* to the *Rhododendron* cultivation areas of the North Sea area of Europe. It was first noticed there in 1993.

It seems most likely that the pathogen then was transported on Rhododendrons from Europe to the *Rhododendron* cultivation/breeding areas of the Nearctic, presumably in the Pacific Northwest (PNW) where the major part of the industry exists. After entering the PNW, the pathogen then probably was transported to California on Rhododendrons, presumably to nurseries/cultivators, but possibly by sale to gardeners directly from the PNW. It was first noticed in California in 1995. Alternatively, the pathogen may have moved to California directly from Europe, if direct *Rhododendron* importation occurred between these areas.

Upon introduction to California (Appendix 1: 3, 3a), the pathogen was able to infect and develop on a newly exposed host lineage, *Quercus* section *Lobatae* (QsL), the red or black oaks. Its development on QsL is sudden and virulent, resulting in rapid mortality, and suggesting a new pathogen/susceptible-host exposure (Appendix 1: 1, 3a). The QsL lineage evolved in the Madro-Tertiary flora and expanded its range northward into what is now the southwest and southern U.S., first during the Pliocene and reaching its current range in the post-Pleistocene.

The pathogen thus far appears not to have infected (or at least been able to develop notable symptoms) on *Quercus* section *Quercus* (QsQ), the white oaks, in either California or Europe. Nor has it infected *Quercus* section *Protobalanus*, the golden or intermediate oaks, in California, or, as far as is known, in Mexico. The QsQ lineage is of Laurasian origin, and may have had contact with the pathogen in Asia, imparting a higher degree of resistance (Appendix 1: 1, 2). Choi & Kim (2000) indicate *Quercus* has approximately 500 species showing three major distribution centers in the world including North America, Europe and eastern Asia; and that eastern Asia show the highest species diversity with almost 250 species, many of which are primitive. The sole presence of QsQ in Europe would explain why European oaks are not affected by this pathogen. Apparent QsQ diseases in Europe involve a separate, but related, pathogen, which attacks the tree's roots.

In California, *Lithocarpus densiflorus* (Tanoak) is also severely impacted (Appendix 1: 1). The speciation epicenter for *Lithocarpus* is also the Oriental region, with L. *densiflorus* being the sole vicariant Nearctic species. This suggests Oriental *Lithocarpus* may have coevolutionary exposure to the pathogen (Appendix 1: 2), imparting resistance, but the vicariant Nearctic species lacked that exposure and remained susceptible (Appendix 1: 4a).

In California, populations of Fagaceae species affected (*Quercus agrifolia, Quercus kelloggii, Lithocarpus densiflorus*) are those in coastal areas where there is significant summer fog. *Quercus wislizeni* and *Quercus parvula* (including var. *shrevei*), both QsL, may form fertile hybrids with *Quercus agrifolia* and *Quercus kelloggii*, indicating genetic compatibility (Appendix 1: 4). *Quercus parvula* is a little known, relatively uncommon species, and although it is often sympatric with *Quercus agrifolia*, has not been reported to be infected yet. Whether this is due to resistance, chance or lack of familiarity with this species by foresters, arborists and others who report tree diseases is not known. *Quercus wislizeni* is, however, adapted to more arid conditions than are the species known to be infected, and where present near the coast in central and northern California largely occurs at elevations above the summer fog belt. This may explain why it has not been affected yet by the pathogen (Appendix 1: 2a), even though it may be genetically susceptible. Distribution maps for California oaks (tree species only) and *Lithocarpus* are provided in Appendix 2. These maps exclude *Quercus parvula*. However, many coastal records of *Quercus wislizeni*, particularly in Monterey and Santa Cruz counties, refer to *Quercus parvula*. The maps are reprinted from Griffin & Critchfield (1972).

Extensions

Susceptible California QsL oaks and *Lithocarpus* eventually should be impacted by the pathogen throughout their range, wherever coastal summer fog or moist sea breezeimpacts the local climate. Such areas climatically favor *Rhododendron* (Appendix

1: 2a). This should be south to the Santa Barbara area. Presumably, this would also involve Oregon populations of *Quercus kelloggii* and *Lithocarpus densiflorus.* It is uncertain if the winter tule fog conditions of the California Central Valley might involve *Quercus wislizeni* at low elevations in that region. Presumably *Quercus kelloggii* populations in the Sierra Nevada (Mt Lassen and south) occur at high enough elevations that they do not commonly contact tule fog; its populations in the northern Central Valley may extend low enough to contact tule fog.

It is uncertain if non-Californian QsL oaks (Appendix 3) might be affected by the pathogen, but a common Madro-Tertiary history and phylogenetic lineage might predispose QsL oaks in the southern and southeastern U.S. to susceptibility (Appendix 1: 4). It is uncertain if the pathogen in the southern U.S. might be favored by warm humid conditions. However, an Anthracnose pathogen on *Cornus florida* in the eastern U.S. requires warm-moist conditions; that pathogen has been introduced into California for at least a decade, in the northwest corner of the state, yet has failed to move out of the initial area presumably due to its tight requirements for the local cool-moist climate in that part of California. If the SOD pathogen accepts the warm-moist conditions of the southern U.S., QsL oaks in that region may be at risk.

Unfortunately adequate assessments of the phylogenetic relationships among the genera of Fagaceae are lacking, but other Nearctic genera in the family include: *Chrysolepis, Castanea,* and *Fagus.* It is uncertain how, or if, these will be affected.

Judd & Kron (1993) assess the phylogenetic relationships among the Ericaceae, to which *Rhododendron* belongs. Based upon both minimum spanning cladistic networks and strict consensus trees, among Nearctic genera, *Kalmia* appears closely related to *Rhododendron* (Judd & Kron 1993: fig. 1a, 1b), and thus may possibly show susceptibility. *Kalmia* are eastern Nearctic, with a single species in the Sierra Nevada and Klamath ranges. Other genera taxonomically proximal to *Rhododendron* (note that *Rhododendron* includes the floral concept of "azalea"), which may show susceptibility, include *Kalmiopsis* and *Phyllodoce;* although Wallace (in: Hickman 1993) treats *Ledum* as a separate genus, more current phylogenetic treatments include it in *Rhododendron. Arbutus, Arctostaphylos, Erica,* and *Vaccinium* are less closely related to *Rhododendron,* and of uncertain susceptibility, although *Arctostaphylos* occurs sympatrically in northern coastal California with *Quercus* and *Rhododendron,* warranting observation.

Testability

Suggestions for testability of this hypothesis:

1. Confirm, through nucleotide sequencing and Koch's postulates, that the *Rhododendron* pathogen and the oak pathogen are the same, exhibiting cross-transmissibility.

2. Confirm the identity of the *Rhododendron* pathogen as the same as that in Europe. Check for its occurrence in the PNW.

1. Confirm that the pathogen cannot infect Californian QsQ oaks, or at least does not develop the virulence noted on QsL oaks.

2. Check infestation areas in California to determine if cultivated *Rhododendron* is present and infected, and if dispersion patterns indicate the potential of transmission to *Quercus*.

3. Check transmissibility to QsL oaks that occur in the southern and southeastern U.S. and Mexico.

4. Check resistance of Oriental *Lithocarpus* species. Check resistance of Palearctic QsQ oaks.

5. Check for climatically restrictive parameters in transmissibility requirements to QsL oaks, especially with regard to atmospheric moisture and temperature regimes. Specifically, whether: (1) cool-moist conditions are necessary for transmissibility, (2) warm-moist regimes support transmissibility, and (3) if winter tule fog conditions support transmissibility.

6. Check susceptibility among *Rhododendron* (including "azalea") species to determine the susceptibility throughout the genus, particularly those species and populations native to northern California and the PNW. Check susceptibility in the following genera: *Kalmia, Kalmiopsis, Phyllodoce, Ledum, Arbutus, Arctostaphylos, Erica* and *Vaccinium*.

Literature Cited

Choi, Kyeung & Ki-Joong Kim. 2000. Molecular phylogeny of *Quercus* (Fagaceae): emphasizing the phylogeny of Asian species. Abstract presented at: Botany 2000 (symposium). Portland, Oregon. 6-10 August 2000

Griffin, J.R. & W.B. Critchfield. 1972. The distribution of forest trees in California. USDA Forest Service Research Paper PSW-82/1972.

Hickman, J.C. (ed.). 1993. The Jepson Manual - higher plants of California. University of California Press, Berkeley.

Judd, W.S. & K.A. Kron. 1993. Circumscription of Ericaceae (Ericales) as determined by preliminary cladistic analyses based on morphological, anatomical, and embryological features. Brittonia, 45 (2): 99-114.

Morin, N.A. et al. (ed). 1997. Flora of North America, North of Mexico. Volume 3. Magnoliophyta: Magnoliidae and Hamamelidae.

Appendix 1

Principles and assumptions employed

1. Pathogens/parasites (P/Ps) that show extreme virulence or mortality on a host are usually maladapted to that host and lack a coevolutionary history with it. Coevolved P/Ps and host complexes should coexist, showing lower virulence and inducing lower levels of mortality/morbidity on a populational level. Within density-dependant constraints, P/Ps that have not had time to coevolve with their hosts are not able to effectively utilize that host over evolutionary time and should be self-limited on it.

2. Probabilistically, one should expect P/Ps to have coevolved in speciation epicenters of host groups. This would allow the P/Ps greater exposure of the range of genetic heterogeneity present in their host clade, through adaptively optimal contact with its species diversity. For surviving host clade members, this should also result in increased resistance to the P/Ps through canalization; unfit lineages would be truncated. In addition, the greater presence of numbers of host species in such epicenters should increase the likelihood of P/P survival during the coevolutionary period, as unfit host lineages are truncated.

2a. As an ancillary function of coevolution in epicenters, one would predict the climatic factors favoring infectivity/development (not necessarily survival during dormance) of a P/P to mirror those edaphic factors favored by its host groups.

3. It is reasonable to assume that a P/P showing extreme virulence or mortality to a host is new to an area and or host, otherwise canalization of the host population would induce development of resistance over time. Further, as the number of severely affected host species in an area increase, as a function of their representation in a clade, one would expect an increasing likelihood of the P/P to be new to that area.

3a. In long-lived host species (>100 years) truncational factors, (e.g. P/Ps), that require normally oscillative (<50 years) factors (e.g. climate) for expression would be expected to show truncation in age-class distribution of the hosts. If this were not the case, it would suggest the truncational factors were not previously present, were operating under a density-dependant constraint, or were coevolved enough to not display a level of mortality to affect host age distribution.

4. The greater genetic similarity within a host clade, as opposed to between host clades, could be expected to allow a P/P to exploit its more closely related host species.

4a. Biogeographically (temporally) separated clade members, which have not had exposure to a P/P, would not be expected to show adaptive resistance to a P/P that has coevolved with its disjunct clade members. However, it would be expected to contain the genetic similarity that would allow exploitation by the P/P. Upon introduction of the P/P, one would expect relatively higher levels of mortality/damage in the disparate clade member. This presupposes that the pathogen/host coevolutionary history happened after the vicariance event.

Appendix 2

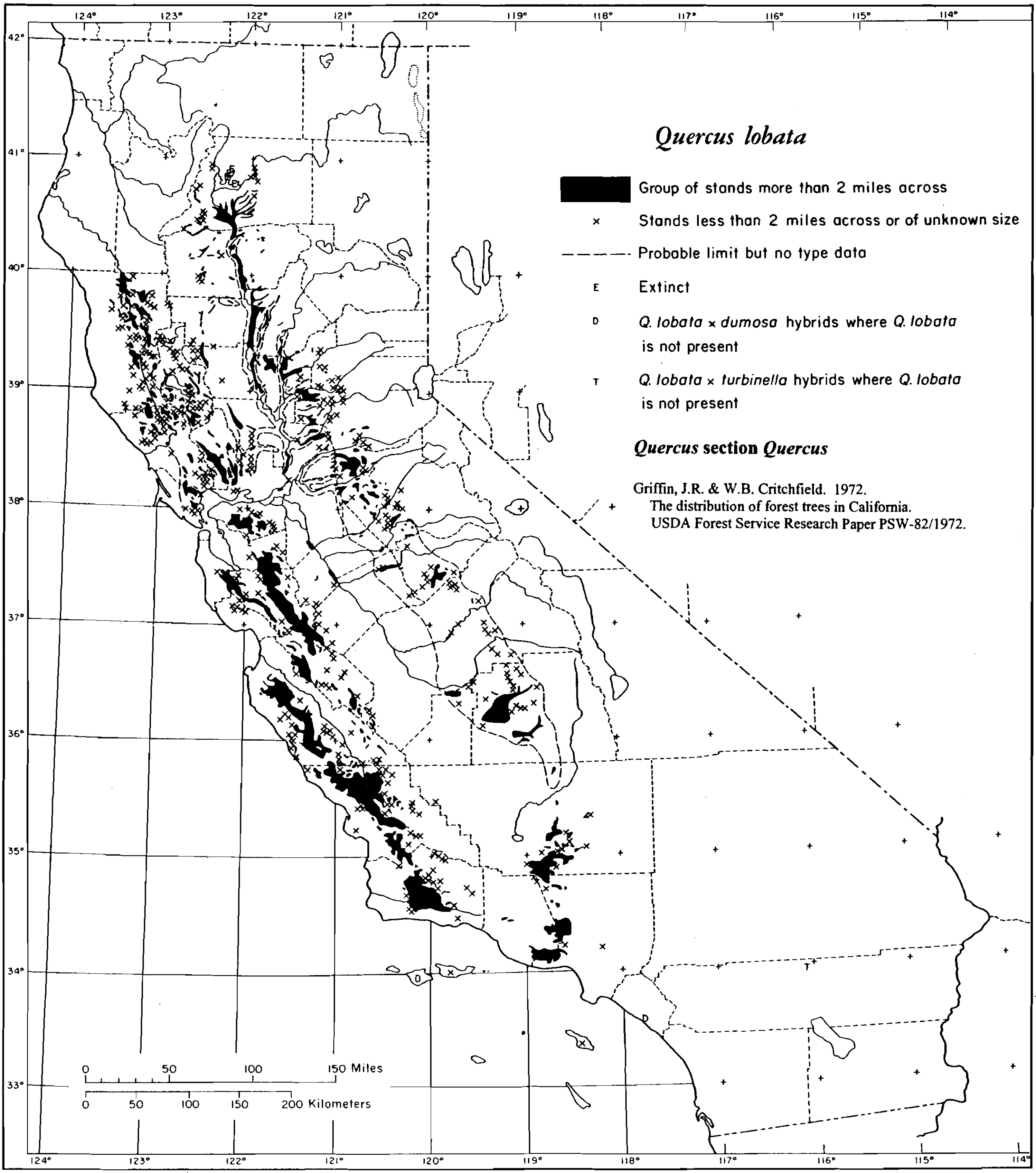
California distribution maps for *Lithocarpus* and *Quercus* species

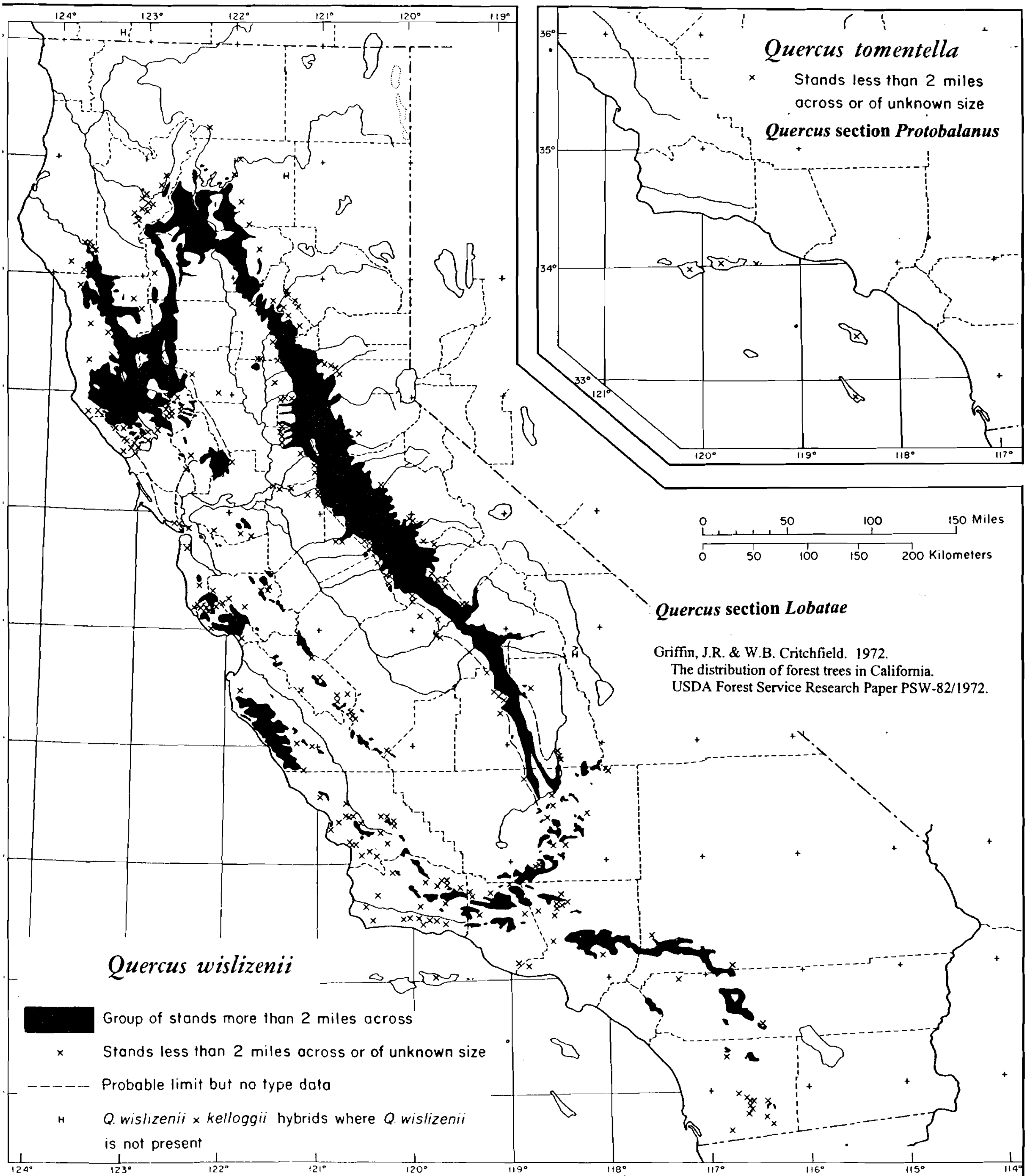
Maps from:
Griffin, J.R. & W.B. Critchfield. 1972.
The distribution of forest trees in California.
USDA Forest Service Research Paper PSW-82/1972.

Appendix 3

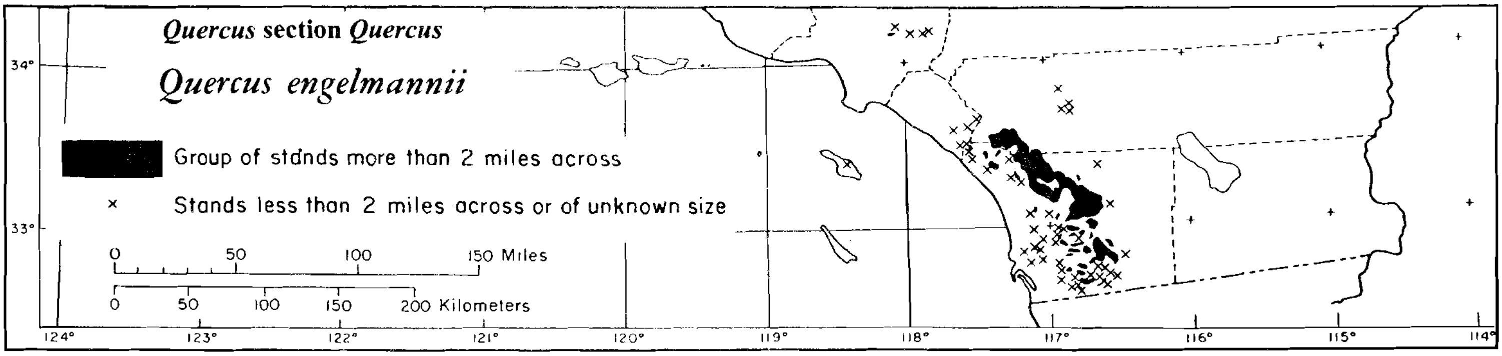
List of *Quercus* section *Lobatae* oaks in North America, north of Mexico, assumed to be at risk
* indicates Californian species

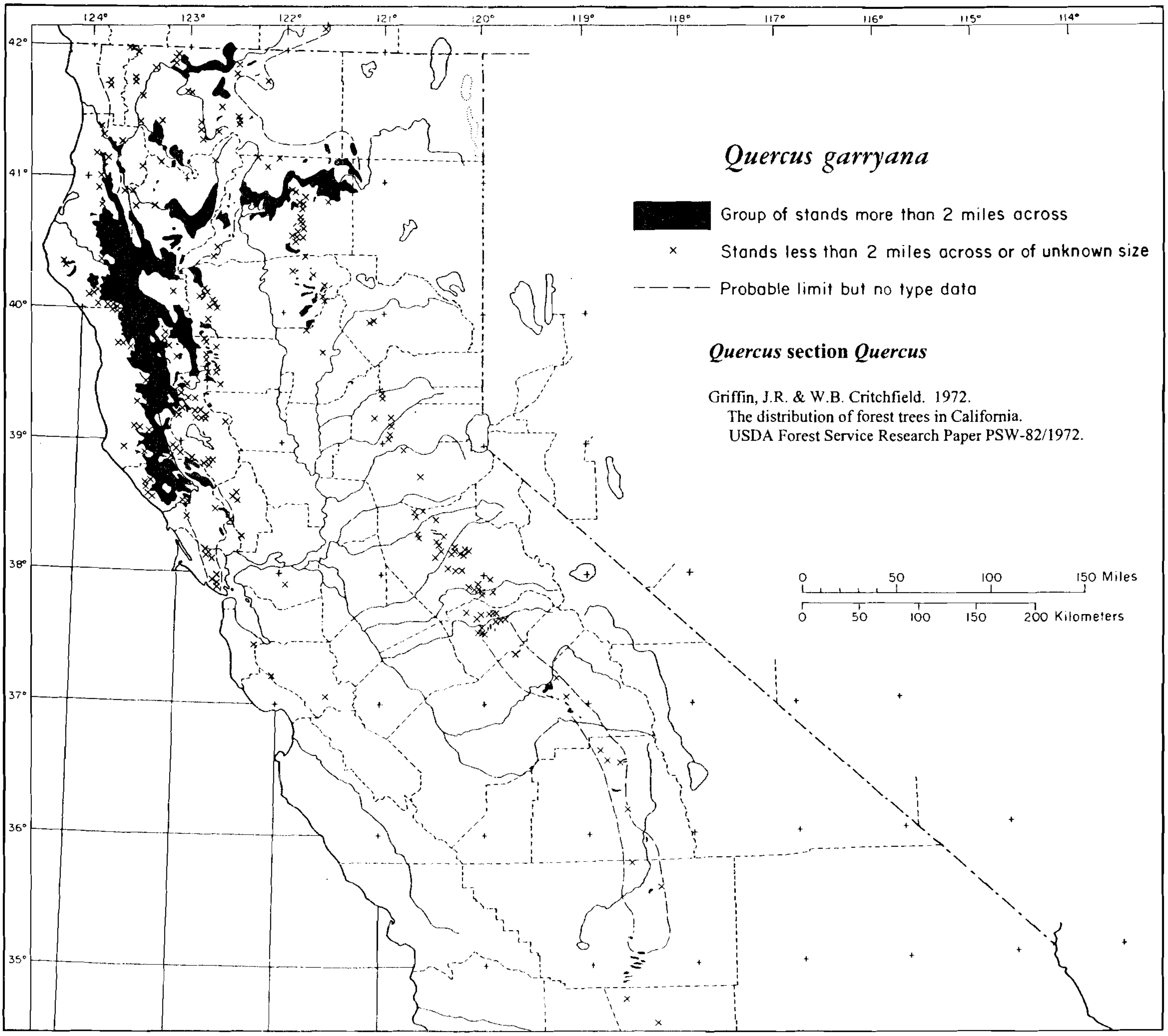
Quercus agrifolia *
Quercus arkansana
Quercus buckleyi
Quercus coccinea
Quercus ellipsoidalis
Quercus emoryi
Quercus falcata
Quercus georgiana
Quercus graciliformis
Quercus gravesii
Quercus hemisphaerica
Quercus hypoleucoides
Quercus ilicifolia
Quercus imbricaria
Quercus incana
Quercus inopina
Quercus kelloggii *
Quercus laevis
Quercus laurifolia
Quercus marilandica
Quercus myrtifolia
Quercus nigra
Quercus pagoda
Quercus palustris
Quercus parvula *
Quercus phellos
Quercus pumila
Quercus robusta
Quercus rubra
Quercus shumardii
Quercus tardifolia
Quercus texana
Quercus velutina
Quercus viminea
Quercus wislizeni *

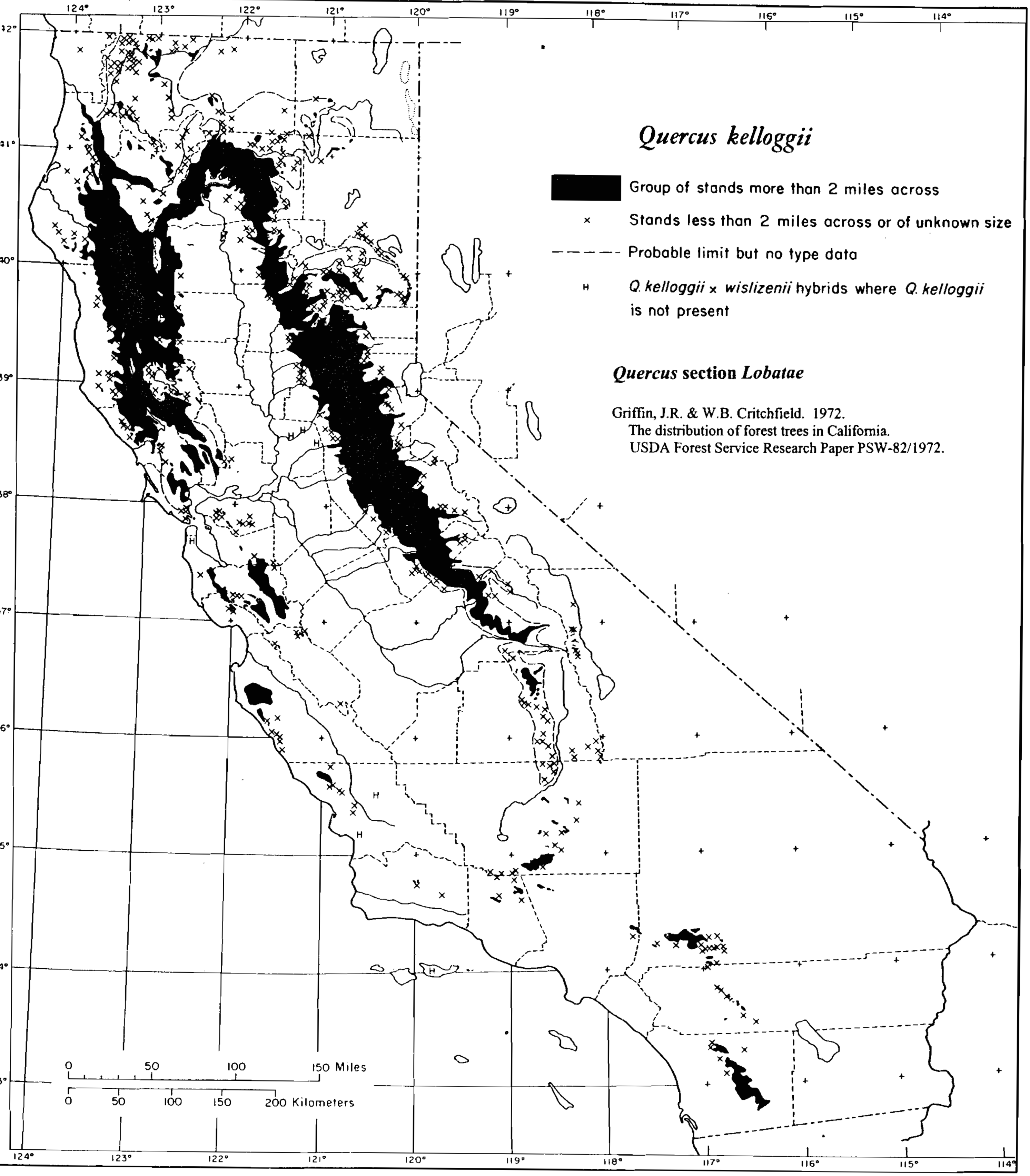

Quercus lobata
Group of stands more than 2 miles across
× Stands less than 2 miles across or of unknown size
Probable limit but no type data
E Extinct
D Q. lobata × dumosa hybrids where Q. lobata is not present
T Q. lobata × turbinella hybrids where Q. lobata is not present
Quercus section Quercus
Griffin, J.R. & W.B. Critchfield. 1972.
The distribution of forest trees in California.
USDA Forest Service Research Paper PSW-82/1972.
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°

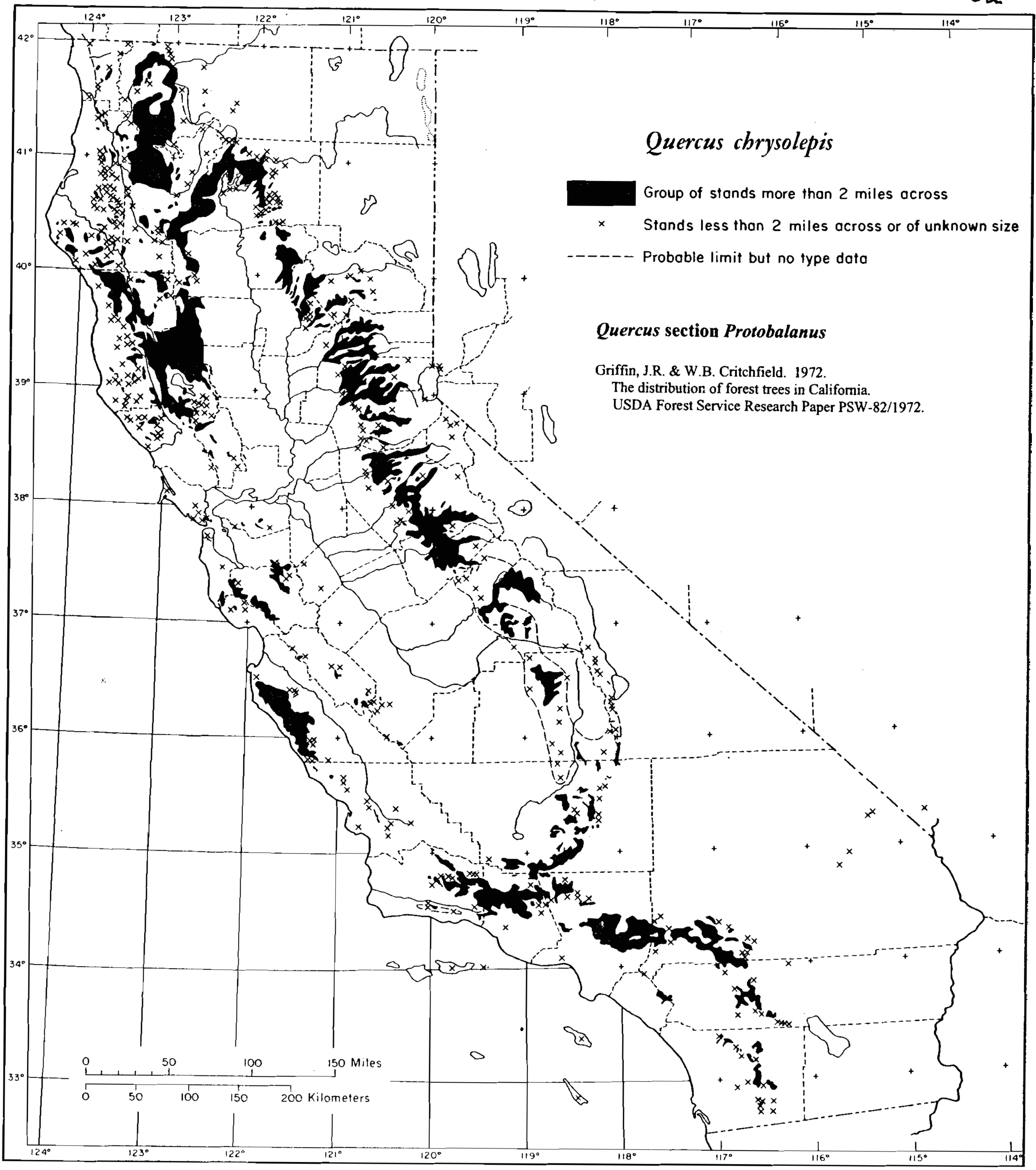


Griffin, J.R. & W.B. Critchfield. 1972.
The distribution of forest trees in California.
USDA Forest Service Research Paper PSW-82/1972.

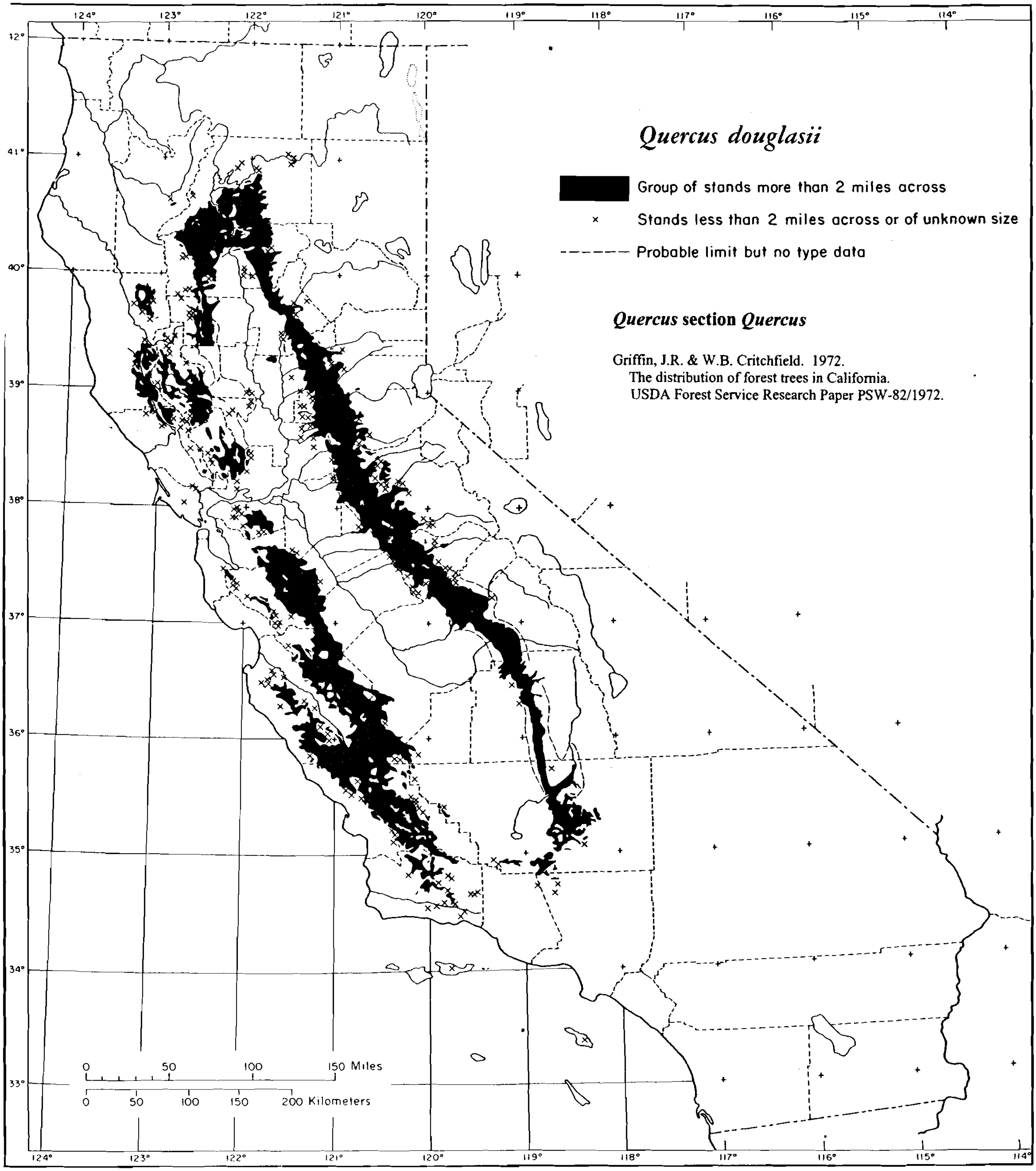

Quercus section Quercus
Quercus engelmannii
Group of stdnds more than 2 miles across
Stands less than 2 miles across or of unknown size
0 50 100 150 Miles
0 50 100 150 200 Kilometers

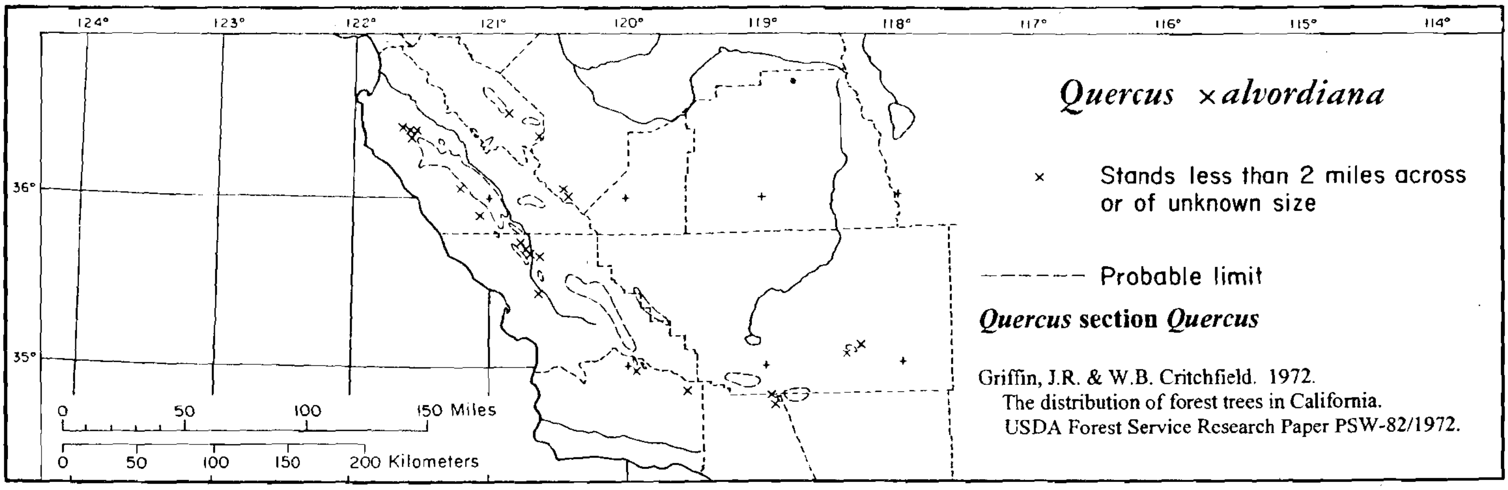

Quercus garryana
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
Quercus section Quercus
Griffin, J.R. & W.B. Critchfield. 1972.
The distribution of forest trees in California.
USDA Forest Service Research Paper PSW-82/1972.
0 50 100 150 Miles
0 50 100 150 200 Kilometers

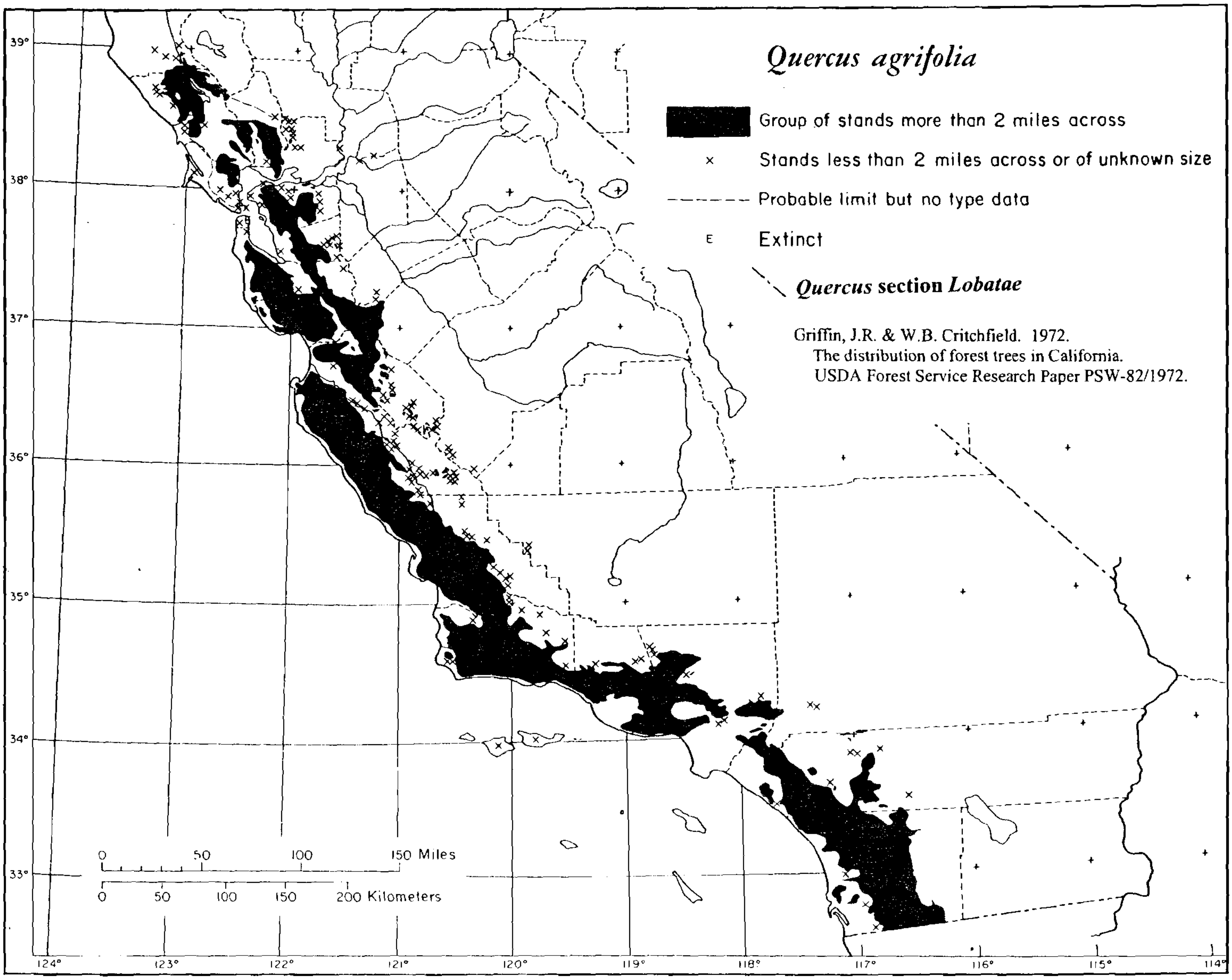

Quercus kelloggii
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
Q. kelloggii x wislizenii hybrids where Q. kelloggii is not present
Quercus section Lobatae
Griffin, J.R. & W.B. Critchfield. 1972.
The distribution of forest trees in California.
USDA Forest Service Research Paper PSW-82/1972.
124°
123°
122°
121°
120°
119°
118°
117°
116°
115°
114°
0
50
100
150 Miles
0
50
100
150
200 Kilometers

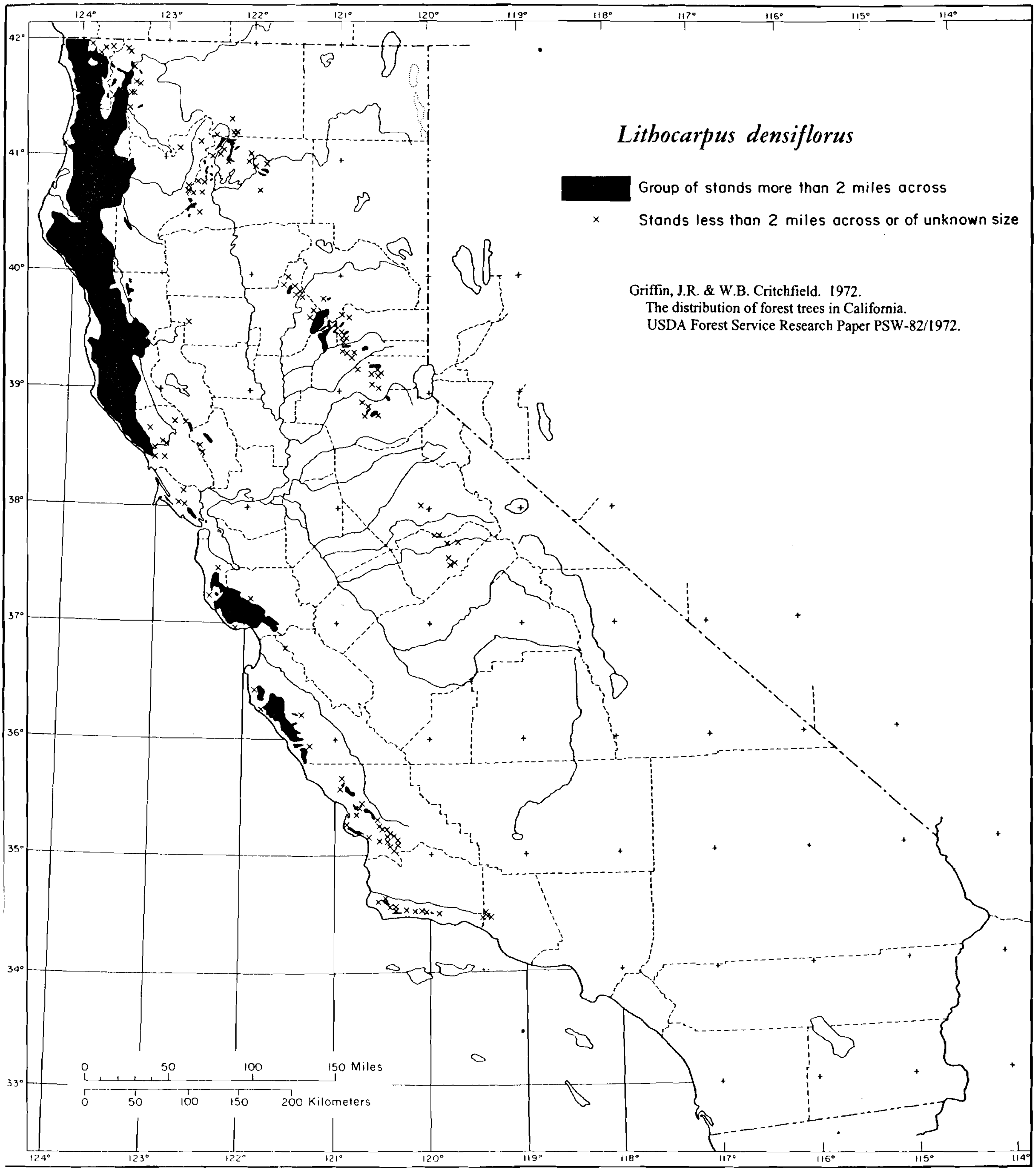


Quercus chrysolepis
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
Quercus section Protobalanus
Griffin, J.R. & W.B. Critchfield. 1972.
The distribution of forest trees in California.
USDA Forest Service Research Paper PSW-82/1972.
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°


Quercus douglasii
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
Quercus section Quercus
Griffin, J.R. & W.B. Critchfield. 1972.
The distribution of forest trees in California.
USDA Forest Service Research Paper PSW-82/1972.
0 50 100 150 Miles
0 50 100 150 200 Kilometers


Quercus ×alvordiana
× Stands less than 2 miles across or of unknown size
------ Probable limit
Quercus section Quercus
Griffin, J.R. & W.B. Critchfield. 1972.
The distribution of forest trees in California.
USDA Forest Service Research Paper PSW-82/1972.
0 50 100 150 Miles
0 50 100 150 200 Kilometers


Quercus agrifolia
Group of stands more than 2 miles across
× Stands less than 2 miles across or of unknown size
------ Probable limit but no type data
E Extinct
Quercus section Lobatae
Griffin, J.R. & W.B. Critchfield. 1972.
The distribution of forest trees in California.
USDA Forest Service Research Paper PSW-82/1972.
0 50 100 150 Miles
0 50 100 150 200 Kilometers



Lithocarpus densiflorus
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Griffin, J.R. & W.B. Critchfield. 1972.
The distribution of forest trees in California.
USDA Forest Service Research Paper PSW-82/1972.
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°